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Barriers to Advanced Servitization: Evidence from the Offshore Industry

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Abstract: This study investigates barriers to advanced servitization in the offshore equipment industry through a qualitative single-case study of a global supplier transitioning from a product-centric to a more service-oriented business model. Drawing on ten semi-structured interviews and secondary company data, the study examines how such barriers manifest in a context characterized by high product complexity, low standardization, low sales volume, and high operational risk. The findings show that, while many barriers resemble those identified in prior servitization research, they become particularly severe and mutually reinforcing in offshore settings. Financial risk, product heterogeneity, and organizational fragmentation emerge as central constraints on performance-based and lifecycle-oriented service models. By developing empirically grounded propositions, the study extends servitization research by identifying important boundary conditions for advanced servitization and showing how its viability depends on the alignment between service ambitions, product characteristics, and organizational readiness.

Keywords: Advanced servitization; servitization barriers; offshore equipment industry; performance-based services; lifecycle services; service business models.

1 Introduction

Servitization, broadly defined as the transformation of a product-centric business model toward one that generates revenue through services across the product lifecycle, has been a central theme in management research for several decades (Vandermerwe & Rada, 1988; Khanra et al., 2021). Firms pursuing servitization seek to move beyond one-off product sales toward offerings such as maintenance, repair, upgrades, and performance-based solutions in order to create closer customer relationships, stronger differentiation, and more stable revenue streams (Baines et al., 2009; Lightfoot et al., 2013). At the same time, the transition is far from straightforward. Empirical research shows that many firms struggle to achieve sustainable profitability from service offerings, and some even reverse

their service initiatives, a phenomenon often referred to as deservitization (Kowalkowski et al., 2017). This persistent challenge underlines the continued importance of understanding barriers to servitization.

A substantial body of research has examined the drivers, stages, and challenges associated with servitization. Firms are commonly described as moving from base services, such as spare parts and warranties, through intermediate services such as maintenance and repair, toward advanced services where value creation increasingly depends on performance- or outcome-based offerings rather than product sales alone (Lightfoot et al., 2013; Aas et al., 2020). Advanced servitization typically requires broader business model innovation, including changes in organizational structures, capabilities, and cross-functional coordination (Baines et al., 2020). Yet, despite this potential, prior studies continue to report the "service paradox," where firms increase service revenues without realizing corresponding gains in profitability (Feng et al., 2021). Understanding this paradox requires attention not only to service strategy in general, but also to the barriers that may constrain more advanced service-based business models in practice.

Existing literature points to barriers across multiple dimensions. Organizational barriers include siloed structures, misaligned incentives, and cultural inertia, all of which may hinder collaboration across product development, sales, and service functions (Zhang & Banerji, 2017). Business model and financial barriers relate to difficulties in pricing performance-based services, forecasting lifecycle profitability, and managing operational risk (Oliva & Kallenberg, 2003). Operational and developmental barriers concern the integration of product and service development, digitalization, and the use of customer and operational data (Kohtamäki et al., 2020). Customer-related barriers include issues of trust, collaboration, and data sharing, while market and regulatory barriers involve fragmented value networks, standardization challenges, and complex contractual requirements (Lee & Chakala, 2019; Peillon & Dubruc, 2019). Increasingly, servitization research emphasizes that the relevance and severity of such barriers are context-dependent and shaped by product complexity, customization, operational risk, and industry conditions (Baines et al., 2020; Shen et al., 2023).

However, empirical insights remain uneven across sectors. Much of the servitization literature has focused on relatively standardized manufacturing and capital equipment contexts, where production volumes are higher and service infrastructures are more predictable. Less attention has been paid to sectors characterized by high-value, low-volume, and engineered-to-order products. This gap is particularly relevant in the offshore equipment industry, where suppliers deliver specialized assets such as motion-compensated cranes, gangways, and loading systems operating in harsh and remote marine environments. These products are often highly customized, technically complex, and mission-critical, meaning that failures may result in substantial financial and operational consequences for customers (Sun, 2019; Toftaker et al., 2022). Such conditions suggest that barriers to advanced servitization may not only be amplified in this context, but may also interact in more complex ways than assumed in more general servitization frameworks.

This study addresses this gap by examining barriers to advanced servitization in the offshore equipment sector through an in-depth case study of a global supplier transitioning from a product-centric to a more service-oriented strategy. In addition to identifying the main barriers, the study explores how these barriers manifest in practice

and how product characteristics, operational constraints, and organizational conditions shape the feasibility of advanced service models.

The study is guided by the following research questions:

RQ1: What are the primary barriers that offshore equipment suppliers encounter when attempting to transition to advanced service-centric business models?

RQ2: How do these barriers manifest in practice, and what organizational and operational conditions influence firms' responses to them?

By focusing on a high-value, high-risk, and highly customized industrial setting, this study contributes empirical insights that enrich innovation management research, particularly regarding the contextual limitations and contingencies of servitization. It provides empirically grounded insights for managers in offshore equipment and similar capital-intensive industries, supporting strategic reflection on the feasibility, design, and boundary conditions of advanced service-based business models. The paper is structured as follows: the next section reviews relevant theory and develops theoretical assumptions that directly inform the research questions, followed by the research methodology, empirical findings, discussion, and conclusions.

2 Theory

The Servitization Concept

Servitization refers to the transformation of a product-centric business model toward one that creates revenue through services across the product lifecycle (Vandermerwe & Rada, 1988; Khanra et al., 2021). Such services may range from basic support and maintenance to more advanced offerings based on performance or outcomes (Lightfoot et al., 2013; Tukker, 2004). Advanced servitization involves a stronger shift from product sales toward service-based value creation and typically requires significant changes in organizational structures, capabilities, and business logic (Baines et al., 2020; Aas et al., 2020).

Rather than representing a discrete initiative, servitization is often described as a gradual transformation process shaped by customer demand, technological opportunities, value network relationships, and organizational readiness (Baines et al., 2020). As firms move toward more advanced service models, the complexity of implementation tends to increase, making strategic alignment and cross-functional integration particularly important (Kristiansen & Aas, 2026).

Servitization Barriers

Although services can generate stable revenue streams and improve customer satisfaction, firms frequently encounter the service paradox, where increased service revenue does not translate into higher profitability (Gebauer et al., 2005; Kohtamäki et al., 2020). Organizations may underestimate the complexity of delivering advanced services, overextend resources, or encounter internal conflicts between product and service units, making careful management and alignment essential.

Empirical and conceptual research identifies a range of barriers to successful servitization. Organizational barriers include siloed structures, cultural inertia, misaligned incentives, and inadequate cross-functional collaboration, all of which impede integration between product development, service, and sales functions (Zhang & Banerji, 2017; Bigdeli et al., 2021). Business model and financial barriers arise from difficulties in pricing performance-based services, forecasting lifecycle profitability, and managing operational and financial risk (Oliva & Kallenberg, 2003; Parida et al., 2014). Operational and developmental barriers encompass the integration of product and service development, digitalization, and the use of customer and operational data to optimize service delivery (Kohtamäki et al., 2020). Customer-related barriers include trust, collaboration, and reluctance to share operational data (Eggert et al., 2014; Zhang & Banerji, 2017), while market and regulatory barriers involve fragmented value networks, standardization challenges, and complex contractual requirements (Lee & Chakala, 2019; Peillon & Dubruc, 2019).

Failure to manage these barriers can result in deservitization, where firms retract service offerings due to unprofitable outcomes or organizational misalignment (Kowalkowski et al., 2017; Gebauer et al., 2005). Research suggests that success requires not only strategic intent but also robust capabilities, resource allocation, and careful attention to inter-departmental and cross-organizational coordination.

Contextual Characteristics and Theoretical Assumptions

The offshore equipment industry exemplifies a context in which servitization is particularly challenging. Firms in this sector typically supply high-value, low-volume, engineered-to-order assets, such as motion-compensated cranes, gangways, subsea equipment, or offshore wind installation systems. Products are often highly customized for specific operational environments, and failures can result in substantial financial and operational consequences, including significant downtime, safety risks, or contractual penalties (Neto et al., 2018; Toftaker et al., 2022).

The complexity and low standardization of these products adds additional challenges. Offshore equipment must comply with multiple classification society rules, local regulations, and client-specific specifications. While some standardization initiatives exist through joint industry projects (Ellingsen et al., 2018), the majority of products remain bespoke. This limits the opportunities for economies of scale in service delivery, increases the uncertainty of maintenance needs, and complicates cost estimation over the product lifecycle (Lee & Chakala, 2019). Based on these factors, it seems plausible to assume that the high product complexity and low standardization contribute to barriers in implementing advanced service offerings.

From an organizational perspective, servitization requires alignment across multiple departments and functions. Product development, service engineering, sales, and customer support must collaborate effectively to design, deliver, and maintain services that complement or replace product sales (Story et al., 2017; de Waal et al., 2019). However, as prior research indicates, firms frequently struggle with internal silos and misaligned incentives, which can hinder knowledge transfer, slow decision-making, and reduce responsiveness to customer needs (Bigdeli et al., 2021). In the context of offshore equipment suppliers, where the technical complexity of products is high and service outcomes are closely linked to operational performance, the need for cross-functional coordination appears particularly critical. Consequently, it is reasonable to assume that

organizational misalignment may represent a key barrier to servitization, particularly in performance-based service models.

Financial and operational risks also shape the feasibility of servitization. Performance-based services inherently transfer operational risk from the customer to the supplier. For high-value offshore equipment, even short periods of downtime can lead to significant losses for both operators and suppliers (Neto et al., 2018; Toftaker et al., 2022). While some firms may mitigate these risks through warranties, insurance, or predictive maintenance, there remains substantial uncertainty around lifecycle costs, failure rates, and unforeseen operational conditions. As a result, it may be assumed that high financial exposure is a central consideration for offshore suppliers evaluating servitization strategies, potentially constraining the scope and design of service offerings.

Technological and digitalization capabilities may further influence the success of servitization. The increasing availability of remote monitoring, predictive maintenance, and digital twin technologies creates new opportunities to optimize service delivery and reduce operational risk (Kohtamäki et al., 2020; Shen et al., 2023). Yet, adoption of these technologies requires investment in both infrastructure and capabilities, as well as integration across organizational boundaries. It is therefore reasonable to assume that the presence or absence of digital capabilities may either facilitate or limit the transition to advanced servitization, and the financial and organizational constraints of offshore equipment suppliers may moderate this effect.

Customer relationships and contractual dynamics are another important consideration. Offshore operators often require guaranteed uptime and may have limited tolerance for risk, making performance-based service contracts attractive but also complex to negotiate (Johnstone et al., 2009; Liinamaa et al., 2016). Trust, collaboration, and data-sharing between supplier and customer are critical for effective service delivery, yet these elements are difficult to operationalize. Based on the literature, it can be assumed that strong customer relationships and carefully structured contracts are likely prerequisites for successful servitization, but achieving this alignment is challenging in practice.

Taken together, these factors suggest that several contextual characteristics of the offshore equipment industry; high product complexity, low standardization, substantial financial and operational risk, organizational silos, technological requirements, and customer dependencies; likely interact to shape the feasibility and outcomes of servitization initiatives. In line with this reasoning, we formulate the following three theoretical assumptions to guide the empirical analysis:

Assumption 1: The high financial risk associated with servitization, particularly in performance-based models, represents a significant barrier to servitization for offshore equipment suppliers due to potential costs related to downtime, performance penalties, and warranty obligations.

Assumption 2: The lack of standardization of equipment for maritime use, combined with varying technical specifications and classification society regulations, creates a major barrier to servitization for offshore equipment suppliers.

Assumption 3: The need for cross-functional alignment presents a major barrier to servitization for offshore equipment suppliers, as rigid organizational structures and silos hinder the transition to service-oriented business models.

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3 Method

Research Design

This study adopted a qualitative single-case research design to explore barriers to advanced servitization in the offshore equipment sector. A qualitative approach was appropriate given the exploratory nature of the research questions and the need to capture in-depth, context-dependent insights into organizational, operational, and strategic challenges.

A single-case design enables a rich, holistic understanding of complex phenomena within their real-life context, particularly when the boundaries between phenomenon and context are not clearly evident (Yin, 2018). In line with prior case study research, this approach was well suited for investigating underexplored contexts and generating empirically grounded insights that may extend existing theory.

The study followed an abductive logic, combining theoretical insights from servitization literature with empirical observations. This allowed iterative movement between theory and data, supporting both the identification of expected barriers and the emergence of context-specific patterns.

Case Selection and Sampling

The case company was a global offshore equipment supplier delivering high-value, engineered-to-order products, including motion-compensated cranes, gangways, and loading systems. The company had historically operated with a product-centric business model but had recently initiated a strategic transition toward service-oriented offerings, including lifecycle services and performance-based solutions.

This context provided a critical and revelatory case for examining servitization barriers, as the company operated in an environment characterized by high product complexity, significant operational risk, and strong customization requirements. These characteristics made it particularly suitable for investigating how barriers to servitization may differ from those identified in more standardized industrial contexts.

A purposive sampling strategy was applied to select informants with relevant knowledge and experience. Ten informants were included, representing key functional areas such as management, sales, product management, aftermarket services, and supply chain. Informants were selected based on their managerial responsibilities, cross-functional experience, and involvement in service-related activities, ensuring a comprehensive and multi-perspective understanding of the phenomenon. An overview of the informants is provided in Table 1.

Table 1 Overview of the informants

Informant	*Role/Function*
A	Product Management, New Build
B	Product Management, New Build
C	Sales Department, New Build
D	Sales Department, New Build

E	Management, Offshore New Build
F	Management, Offshore New Build
G	Management, Aftermarket Division
H	Management, Aftermarket Division
I	Management, Aftermarket Division
J	Sourcing And Supply Chain, New Build

Data Collection

Primary data were collected through semi-structured interviews, allowing for a balance between consistency across interviews and flexibility to explore emerging themes (Kvale & Brinkmann, 2009). An interview guide was developed based on the research questions and relevant servitization literature, covering topics such as service strategy, organizational challenges, product characteristics, customer interactions, and risk management.

The interviews were conducted both in person and remotely, depending on informant availability. All interviews were recorded with consent and subsequently transcribed verbatim to ensure accuracy. Follow-up clarifications were conducted where necessary to validate interpretations and reduce the risk of misrepresentation.

To enhance the robustness of the study, secondary data were also collected and used for triangulation. These included company strategy documents, product portfolio descriptions, and internal process materials. The use of multiple data sources strengthened the credibility of the findings by enabling cross-verification of key insights (Yin, 2018).

Data Analysis

Data analysis followed a flexible pattern-matching approach, combining deductive and inductive elements (Bouncken et al., 2021). Initially, a coding scheme was developed based on existing servitization theory and the theoretical assumptions outlined in the previous section. This provided a structured framework for identifying expected barriers.

Subsequently, an inductive analysis was conducted to capture emerging themes and context-specific insights not fully explained by existing theory. This iterative process allowed refinement of categories and identification of relationships between different types of barriers.

The analysis involved repeated reading of interview transcripts, coding of relevant passages, and comparison across informants to identify consistent patterns and divergences. By systematically comparing empirical findings with theoretical expectations, the study identified both confirmatory evidence and context-specific extensions to existing servitization research.

To enhance the credibility and reliability of the findings, multiple data sources were triangulated, and interpretations were grounded in direct empirical evidence from the interviews.

4 Findings

Our analysis of the case company suggested several barriers to advanced servitization in the offshore equipment sector. Findings were organized around the three research assumptions. While certain insights intersect multiple assumptions, we present them according to the most relevant category.

Financial Risk and Performance-Based Servitization (Assumption 1)

We found that the high financial risk associated with performance-based services represents a substantial barrier. Complex, high-value products, combined with potential downtime, create significant exposure. Limited product maturity and operational data further constrain the company's ability to implement predictive maintenance or uptime guarantees.

As exemplified by the case of motion-compensated gangways, Informant H explained:

> "The design of the gangway was really at the beginning of the delivery, and there were a lot of technical problems. The maturity of the product was not satisfactory for a leasing agreement."

Informants also emphasized the role of spare-part availability and speed. Informant C stated:

> "A lot of dissatisfied customers due to the handling of spare parts (…) this has directly led to loss of some new sales contracts."

Despite these challenges, several informants indicated customer interest in alternative models. Informant D noted:

> "If we could guarantee operability and paid penalty if it did not work, it would be interest from someone in the market. It is expensive for the customer with downtime, so for them to get rid of that risk would be a big upside."

Our findings suggest that performance-based services are most feasible on more mature, medium-complexity products, such as the 100-ton AHC crane, where operational risks are lower and customer trust is higher.

Product Complexity and Standardization (Assumption 2)

We found that low standardization, customized designs, and varying vessel interfaces create significant barriers. Diverse customer specifications and regulatory requirements amplify technical complexity, particularly for newer products.

For example, Informant B highlighted the impact of varied technical specifications:

> "Customers have different technical specifications, different software programs, and infrastructure limits."

When discussing specific product lines, informants emphasized differences in feasibility:

- AHC Cranes: Informant H observed that medium-sized cranes could support pilot performance-based services:

> "We had to give up leasing of the gangway at the time, but I think it would be possible on more mature products like a medium-sized AHC Crane."

- Gangways: Informant A described the challenge of complex vessel interfaces:

> "Feedback from customers is that when the gangway is working, it is the best gangway in the market. One problem is that alarms go off without information to the operator, forcing them to pause operation."

- Offloading/Bowloading Systems: Informant G emphasized the importance of spare-part logistics for maintaining market share:

> "It is a big threshold for customers to choose another company to do service on our products (…) if we do our job, then we should keep that market to a large degree. But we lost a lot of this market, and therefore we moved the spare part operation back to Norway."

These findings suggest that product complexity and lack of standardization limit the applicability of conventional servitization approaches, requiring tailored solutions for different products.

Organizational Alignment and Service Delivery (Assumption 3)

We found that organizational factors, including silos between divisions, reactive service culture, and misaligned profit-and-loss responsibilities, pose major barriers to servitization.

Informant E highlighted structural challenges:

> "All business lines are operating very differently, with different processes and different systems."

The handling of spare parts was repeatedly mentioned. Informant C described the consequences of centralizing spare-part operations:

> "These are very complex machines and there are many variants, which makes it almost impossible for someone without product knowledge to handle. Customers suffer from this."

Informants also emphasized customer trust and proactive service as critical issues. Informant I stated:

> "We have basically three levels of service: spare parts, maintenance, and project services. Everything is reactive."

Informant B added:

> "Our products are key elements on the vessels. If the gangway doesn't work, the ship cannot do what it is intended for. This should push customers toward us, but gaps in service reduce this potential."

Our findings suggest that improving cross-functional alignment and proactive service practices is crucial to support performance-based and lifecycle-oriented business models.

5 Discussion and conclusions

Financial Risk and Performance-Based Servitization

Our findings support the assumption that financial risk represents a central barrier to advanced servitization in the offshore equipment sector. At the same time, they extend existing literature by showing that this risk is not only linked to contract design or pricing challenges, but is amplified by the interaction between product complexity, lifecycle uncertainty, and operational preparedness.

First, the findings indicate that performance-based and leasing-oriented service models are difficult to sustain when they are not firmly anchored in the firm's strategic and organizational priorities. Previous research has shown that the transition from product-centric to service-centric business models requires alignment between value creation logic, organizational structures, and managerial commitment (Tukker, 2004; Kindström & Kowalkowski, 2014). In the present case, earlier initiatives related to leasing and performance-based offerings were described as fragile and difficult to maintain over time. This suggests that advanced servitization may remain peripheral unless it is embedded in the broader strategic direction of the firm. In this respect, our findings reinforce the argument that advanced service models require more than commercial ambition; they also depend on long-term organizational commitment and the ability to absorb financial and operational uncertainty. Furthermore, as noted by Liinamaa et al. (2016), the challenge of designing contracts that balance customer value, supplier risk, and profitability makes financial uncertainty a practical barrier to servitization rather than a purely analytical concern.

Second, our findings highlight the importance of product maturity and data availability in shaping the financial feasibility of advanced services. Prior studies emphasize that pricing and managing performance-based contracts depend on the supplier's ability to estimate lifecycle costs, predict failures, and assess operational risk (Oliva & Kallenberg, 2003). In the case company, however, these capabilities varied considerably across product categories. More mature products with longer operational histories provided a stronger basis for assessing risk, whereas newer and more technically complex systems, such as motion-compensated gangways, were associated with unresolved technical problems and insufficient operational data. This suggests that, in offshore equipment contexts, the feasibility of advanced servitization is contingent on product-specific maturity thresholds. Below such thresholds, uncertainty becomes too high for suppliers to confidently assume performance responsibility.

Third, the findings show that downtime exposure constitutes the dominant mechanism through which financial risk materializes. Offshore equipment operates in mission-critical settings where even relatively limited technical failures may interrupt vessel operations and generate substantial economic consequences for both customer and supplier. This is broadly consistent with prior research highlighting the cost implications of downtime in offshore operations (e.g., Toftaker et al., 2022). However, our findings also show that this exposure is shaped by organizational and operational factors within the supplier firm itself. In particular, shortcomings in spare parts handling and service responsiveness increase the duration and consequences of equipment failure, thereby intensifying financial risk. This extends earlier work on service delivery and organizational integration (Story et al., 2017) by suggesting that capabilities such as spare parts logistics and timely maintenance support should not be viewed merely as supporting

activities. In high-risk servitization contexts, they are central mechanisms for controlling supplier exposure and making advanced service models viable.

Taken together, these findings suggest that financial risk in advanced servitization is not simply a matter of pricing complexity or contractual design, as often emphasized in the literature. Rather, it emerges from the interaction between product maturity, lifecycle predictability, downtime exposure, and the supplier's operational ability to respond effectively when failures occur. In this sense, financial risk is deeply embedded in both the technical and organizational conditions of the servitization context.

Based on this discussion, we propose the following:

Proposition 1a: In offshore equipment contexts, the combination of high product complexity and limited lifecycle predictability increases supplier risk in performance-based service models, thereby constraining the feasibility of advanced servitization.

Proposition 1b: In high-risk offshore equipment contexts, operational capabilities that reduce downtime, particularly effective spare parts management and responsive service delivery, are critical for mitigating supplier risk and enabling advanced servitization.

Product Complexity and Standardization

Our findings support the assumption that low standardization represents a major barrier to advanced servitization in the offshore equipment sector. More specifically, they show that this barrier arises from the interaction between customer-specific customization, vessel-interface complexity, and regulatory variation. Together, these conditions reduce the standardization needed to scale service offerings and deliver them efficiently across the installed base.

First, the findings show that customer-specific customization increases heterogeneity across products within the same category. Customers often tailor equipment to vessel design, operational needs, and technical preferences, resulting in substantial variation in configurations, software, and components. This limits the extent to which service routines can be standardized and increases the need for product-specific competence in aftermarket operations. In this respect, our findings support prior research emphasizing the role of standardization in servitization (Lee & Chakala, 2019), while also showing how customization undermines lifecycle efficiency in offshore settings.

Second, the findings suggest that vessel interfaces represent an additional and underexplored source of servitization complexity. For products such as motion-compensated gangways, service performance depends not only on the equipment itself, but also on how it is integrated with the customer's vessel through mechanical, sensor-based, and software-related interfaces. This makes service outcomes more system-dependent and less predictable, thereby complicating the design and delivery of advanced service models.

Third, regulatory heterogeneity further constrains standardization. Different classification society requirements, combined with customer-specific specifications, make it difficult to establish uniform product architectures, maintenance routines, and component usage across the installed base. This is important because advanced and digital servitization often depend on some degree of standardization to enable scalable and efficient service provision (Hydle et al., 2021). Our findings suggest that such

standardization is difficult to achieve in offshore equipment contexts, where customization and compliance requirements remain pervasive.

Taken together, these findings indicate that barriers to advanced servitization in offshore equipment are shaped not only by product complexity, but by the broader technical and regulatory system in which the product operates.

Based on this discussion, we propose:

Proposition 2: In offshore equipment contexts, customer-specific customization, vessel-interface complexity, and regulatory heterogeneity reduce standardization across the installed base, thereby constraining the scalability and efficiency of advanced servitization models.

Organizational Alignment and Service Delivery

Our findings support the assumption that cross-functional misalignment represents a major barrier to advanced servitization in the offshore equipment sector. More specifically, they show that this barrier is reinforced by reactive service practices, fragmented digital infrastructures, and financial structures that separate product sales from lifecycle value creation. Together, these conditions reduce the supplier's ability to deliver coordinated and proactive lifecycle services.

The findings indicate that organizational silos weaken lifecycle support by limiting competence sharing and coordination across divisions and business lines. Prior servitization research has emphasized the importance of integration between product development, sales, and service units (de Waal et al., 2019; Bigdeli et al., 2021). In the present case, however, different systems, processes, and responsibilities made service delivery dependent on informal coordination rather than established organizational routines. This not only constrains service delivery, but also the development of more advanced product–service offerings. This aligns with Aas et al. (2023), who show that product–service system development processes are contingent on the type of service offering and target business model rather than organized through one uniform process logic.

The findings further show that this fragmentation is reflected in a predominantly reactive service logic. Informants described the aftermarket as responding mainly to customer requests rather than anticipating service needs or using installed-base knowledge proactively. In the case company, weaknesses in spare parts handling, limited service capacity, and slow follow-up contributed to customer leakage and weakened the firm's reputation. This extends prior research by showing that reactive service delivery undermines not only efficiency, but also the trust and installed-base retention on which advanced service agreements depend (Lightfoot et al., 2013; Bustinza et al., 2015).

A related issue concerns digital integration. Although the company had access to substantial operational data from installed products, these data were used mainly for ex post troubleshooting rather than for systematic learning or service improvement. This supports research showing that digital technologies and remote diagnostics may strengthen servitization (Kohtamäki et al., 2020; Parida et al., 2019). However, our findings suggest that such potential remains unrealized when digital systems are fragmented and data are not integrated across business lines and lifecycle stages.

Finally, separate profit-and-loss structures across divisions further constrained servitization by reinforcing product-centric decision logics. When new build and aftermarket activities are evaluated independently, lifecycle profitability becomes

difficult to assess and service-based value creation remains weakly embedded in pricing decisions. This is consistent with prior research showing that servitization may require stronger integration between product and service revenues (Oliva & Kallenberg, 2003; Kohtamäki, Einola et al., 2020).

Taken together, these findings suggest that organizational barriers to advanced servitization in offshore equipment are best understood as a problem of structural and operational fragmentation. Based on this discussion, we propose the following:

> *Proposition 3a: In offshore equipment contexts, organizational fragmentation across divisions, systems, and processes reduces the supplier's ability to deliver coordinated and proactive lifecycle services, thereby constraining advanced servitization.*

> *Proposition 3b: In offshore equipment contexts, the combination of fragmented digital infrastructures and separated profit-and-loss responsibilities weakens lifecycle learning and service-based pricing logics, thereby limiting the development and viability of advanced servitization models.*

Theoretical Contributions

This study contributes to servitization research by extending current understanding of barriers to advanced servitization in a context that has received limited attention, namely the offshore equipment industry. Rather than identifying entirely new barriers, the study shows how established barriers become more severe and mutually reinforcing under conditions of high product complexity, low standardization, low sales volume, and high operational risk (Zhang & Banerji, 2017; Baines et al., 2020).

The findings highlight the context-dependent nature of servitization barriers by showing that financial risk, organizational silos, and digital underutilization become particularly consequential in offshore settings characterized by mission-critical uptime requirements, extensive customer-specific customization, and harsh operating environments (Oliva & Kallenberg, 2003; Shen et al., 2023). They also show that product-related and organizational barriers are closely interdependent, extending prior research that has often treated such barriers as analytically separate categories (Baines et al., 2020; Kohtamäki et al., 2020).

The study further contributes to research on advanced and digital servitization by indicating that scalable service models depend on a degree of standardization that may be difficult to achieve in highly customized offshore environments (Hydle et al., 2021; Kohtamäki et al., 2020). Based on these insights, the study develops empirically grounded propositions that specify how financial risk, product heterogeneity, and organizational fragmentation constrain advanced servitization in complex offshore contexts. More broadly, the findings suggest that advanced servitization should not be assumed to be equally feasible or desirable across firms and industries. Instead, its viability appears contingent on the fit between service ambitions, product characteristics, and organizational readiness. In this respect, the study highlights important boundary conditions for more general servitization frameworks and provides a basis for future research in other high-risk, low-volume, and engineered-to-order industries.

Practical implications

The propositions developed in this study also carry practical implications for managers in offshore equipment firms. The findings suggest that advanced servitization should not be

approached primarily as a sales initiative, but as a broader capability-building effort. A key managerial priority is therefore to develop a stronger lifecycle perspective on product costs, revenues, and risks, so that service offerings can be priced in ways that are both competitive and profitable.

The study also highlights the importance of product maturity, installed-base knowledge, and access to operational data. In low-volume and highly customized contexts, firms need mechanisms for learning systematically from products in operation in order to improve risk assessment, maintenance planning, and service development. At the same time, the findings indicate that advanced servitization is difficult to achieve when service delivery remains reactive and responsibilities are fragmented across divisions, systems, and profit structures. Managers should therefore prioritize cross-functional coordination, spare parts responsiveness, and better alignment between new build and aftermarket activities.

More fundamentally, the findings suggest that advanced servitization is not equally feasible for all firms. Managers should therefore assess whether such business models are compatible with their product characteristics, operational capabilities, and organizational readiness before committing to more advanced service strategies. Although based on a single case, the study offers guidance on where offshore equipment suppliers should focus their efforts when seeking to make servitization more viable.

Limitations and Future Research

This study has several limitations. It is based on a single case company within one offshore business line, which limits the transferability of the findings. In addition, the study draws on interviews with ten key informants; although the data showed clear patterns, other informants or organizational levels might have added further nuance. The findings should therefore be understood as analytically rather than statistically generalizable. Finally, the flexible pattern matching approach involves interpretive choices regarding which theoretical patterns are emphasized (Bouncken et al., 2021).

These limitations point to opportunities for future research. Multi-case studies could examine whether the propositions developed here hold across other offshore equipment firms and related industries. Longitudinal research could also explore how such barriers evolve over time and under what conditions advanced servitization becomes more viable.

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