GESTÃO & PRODUÇÃO

ISSN 0104-530X (Print)
ISSN 1806-9649 (Online)

ORIGINAL ARTICLE

Failure-to-service may lead industrial business to bankruptcy: drivers and ways to mitigate them

Falhas no serviço pode levar negócios industriais à falência: drivers e ações para mitigá-las

Luiz Reni Trento[1], Michele de Souza[1], Leandro Zvirtes[2], Giancarlo Medeiros Pereira[1]

[1] Universidade do Vale do Rio dos Sinos – Unisinos, Programa de Pós-graduação em Engenharia de Produção e Sistemas – PPGEPS, São Leopoldo, RS, Brasil. E-mail: luiz.trento1963@gmail.com

[2] Universidade do Estado de Santa Catarina – UDESC, Joinville, SC, Brasil.

How to cite: Trento, L. R., Souza, M., Zvirtes, L., & Pereira, G. M. (2022). Failure-to-service may lead industrial business to bankruptcy: drivers and ways to mitigate them. *Gestão & Produção*, 29, e5809. https://doi.org/10.1590/1806-9649-2022v29e5809

Abstract: In recent decades, the service strategy has increased in importance both in scientific research and on the agendas of industrial organizations. Service can help such companies to diversify their offerings, avoiding commoditization as well as increasing operational results. However, failures in the service process may generate significant negative impacts on these organizations. This case study investigates the drivers that contributed to the failure in service delivery in the industrial organization. Such drivers ultimately bankrupted the profit organization. The article uses the qualitative exploratory methodology and a unique, in-depth case study. The findings reveal the following drivers: assigning the operation to inexperienced employees; lack of ability to implement organizational needs; organizational alignment; and knowledge of how to disable complex operations. Also, the study contributes to the construction of a framework to mitigate such drivers. The framework is structured in service operation, decommissioning, and implementation.

Keywords: Servitization; Service Infusion; Service failure; Bankruptcy.

Resumo: Nas últimas décadas, a estratégia de serviços ganhou importância tanto na pesquisa científica quanto nas agendas das organizações industriais. A servitização pode ajudar essas empresas a diversificar suas ofertas, evitando a comoditização e aumentando os resultados operacionais. No entanto, falhas no processo de servitização pode gerar impactos negativos significativos nessas organizações. Este estudo de caso investiga os fatores que contribuíram para a falha na prestação de serviços. Esses impulsionadores acabaram levando a organização lucrativa à falência. O artigo utiliza a metodologia exploratória qualitativa e um estudo de caso único e aprofundado. Os resultados revelam os seguintes motivadores: atribuir a operação a funcionários inexperientes; falta de habilidade para implementar as necessidades organizacionais; alinhamento organizacional; e conhecimento de como desabilitar operações complexas. Além disso, o estudo contribui para a construção de um framework para mitigar tais direcionadores. O framework é estruturado em operação de serviço, descomissionamento e implementação.

Palavras-chave: Servitização; Infusão de serviços; Falhas na servitização; Falência.

Received Dec. 9, 2019 - Accepted Jan. 5, 2021
Financial support: The authors would like to thank the Conselho Nacional de Desenvolvimento Científico e Tecnologico ´ – CNPq (edital 23/2018) and the PQ grant Process: 306785/2019-6 for financial support for research.

1 Introduction

The service is understood by many manufacturing as a natural progression of their business. More mature companies see servitization as a distinct mechanism to create new business and drive differentiation. Such a mechanism can extend the product life cycle by preventing the business from disappearing (Vandermerwe & Rada, 1988). The service business model involves the commitment to improving the value of customer use. This commitment entails greater responsibility for the overall process of value creation. It implies an increase in the relative importance of services in the companies' business portfolio (Kowalkowski et al., 2017b). However, many manufacturers expand the service business increase costs but fail to increase financial returns (Gebauer et al., 2005). Recent research has shown that servitization may increase the risk of bankruptcy (Benedettini et al., 2015); increase revenue percentages, but profit streams are unsatisfactory (Eggert et al., 2014); or the size of the customer's risk may limit premium revenue (Reim et al., 2016).

The challenges of servitization are paradoxical (Kohtamäki et al., 2017). These challenges arise from the paradox of performance between efficient product manufacturing and the ability to add services (Gebauer et al., 2005; Kohtamäki et al., 2017). These challenges may also arise in need of new business models to customize integrated solutions, including advanced services (Kohtamäki et al., 2017). As a result, companies face tensions between these juxtaposed demands. These tensions' continuity may stimulate other organizational tensions and paradoxes (Kohtamäki et al., 2017). Despite efforts to provide services, many companies still have problems implementing them (Benyoussef Zghidi & Zaiem, 2017).

Also, the literature calls attention to understand the factors related to the strengths and weaknesses of internal management (Benedettini et al., 2015) to investigate how the tension between product and service logic can be better managed (Kowalkowski et al., 2017a), to investigate whether the transition to a dominant service business occurs as an organizational and planned transformation (Luoto et al., 2017), or present data on processes and results (Brax & Visintin, 2017).

The present case study investigates the drivers that contributed to the failure-to-service provided by the company ElecLtd (a pseudonym). The ElecLtd is a Brazilian industrial company in the electro-electronic segment. Such servitization entailed accumulated losses that led to the bankruptcy. Before servicing, EletricLtd had a consolidated performance in the market from qualified products. Besides, ElecLtd's employee team comprised 1,200 employees, and revenues and profitability were around the US $ 600 million and the US $ 60 million per year. Also, this research indicates the mitigating factors for dealing with these drivers. The analysis of these elements gave rise to the following research question (R.Q.): *"Which drivers contributed to the failure-to-service and how companies can mitigate them"?*

The remainder of the article is structured as follows. The first section presents the study's literature review based on the following fundamental concepts: failure-to-service drivers and mitigation failure drivers. The single case study methodology is then detailed, giving special attention to the framing and explanation of data analysis around practices and mechanisms, following the findings that uncover and demonstrate a complex set of drivers that led to the failure-to-service and how to mitigate them. The identified drivers and possible ways to mitigate them are then discussed. Finally, the study's theoretical and managerial implications are considered, along with limitations and suggestions for future research.

2 Literature review

Servitization consists of strategies that focus on capabilities, human resources, finances, and processes to offer integrated services with innovative technologies that add value to products (Kamal et al., 2020). Service provision can boost manufacturing firms

(Benyoussef Zghidi & Zaiem, 2017; Kamal et al., 2020). Such offers can often manifest themselves through the relationship with their clients (Kindström et al., 2013; Lin et al., 2011); or the fundamental relationship between physical product and associated services (Finne et al., 2013). The transition to service provision can be performed both financially and in declining situations (Böhm et al., 2017). Firms in declining demand and profits may opt for services to increase revenue streams (Böhm et al., 2017; Gebauer et al., 2005). Engaging in servitization requires the support of top managers and stakeholders to ensure adequate support and initial resources (Dmitrijeva et al., 2020). Be aware that the adoption of a service strategy is no guarantee of success. Companies may fail due to insufficient knowledge, resources, and competence (Valtakoski, 2017). The scariest is the knowledge that few companies can deal efficiently and quickly with the inherent challenges of service (Benedettini et al., 2015); besides, the services business's presence may increase the risks of bankruptcy (Benedettini et al., 2015). In the following, we highlight the failure drivers identified in the literature.

2.1 Failure-to-service drivers

The failure-to-service can occur because companies may be stuck to a mismatch between strategy and organizational design factors (Dmitrijeva et al., 2020; Gebauer et al., 2010; Huikkola et al., 2020; Kamal et al., 2020). The results of financial analyses show that these companies' revenues increase, but the profits generated may be smaller than pure manufactures (Neely, 2009; Zimmer et al., 2020). Another issue discussed in the literature is the organizational ambivalence that results from coexisting product and service orientations that can lead to resource inefficiency, dilution of responsibility, and restricted decision making (Baines & Lightfoot, 2011; Lenka et al., 2018; Peillon et al., 2018). Also, the lack of attention to environmental (context the internal and external environment), organizational, and relational uncertainties may affect the performance of the service operation (Baines & Lightfoot, 2011; Dmitrijeva et al., 2020; Kreye, 2017b).

Moreover, the service offer can also fail because it does not create value for the customer (Kamal et al., 2020; Valtakoski, 2017). Besides, the offer of more service does not increase the chance of survival of the companies (Benedettini et al., 2017). Such offers may bring benefits, but these companies need to address the risk of resource scarcity, inventory loss, coordination complexity, and investor uncertainty in potential future earnings (Benedettini et al., 2017).

Another issue that can contribute to failure lies in the inability to identify operational risks. The operational risks of servitization may be related to technical, behavioral, and delivery competence (Reim et al., 2016; Ziaee Bigdeli et al., 2018). Management risks mean to be incapable of avoiding risks; the costs to reduce it may be higher than the savings; it is challenging to divide the risks with the clients (Reim et al., 2016). Furthermore, this issue can challenge controlling partnerships and modeling and understanding their cost and profitability implications (Neely, 2009). Collaborative strategic partnerships within supply chain networks can mitigate this risk and prove crucial to building entry barriers against external competitors (Ziaee Bigdeli et al., 2018).

Also, critical barriers in service integration lie in identifying and managing increasing operational and financial risks, integrating and coordinating components, and third-party competency (Kowalkowski et al., 2015). Involving the supplier in the client's operation requires a higher degree of trust. Because customers share operational risks with the manufacturer to avoid the failure of the operation itself (Raddats et al., 2017); besides, the diversification of the service strategy may increase the risks of bankruptcy (Benedettini et al., 2015). This

diversification increases costs and internal controls; requires new resources; requires structural changes; needs different product managerial attitudes (Benedettini et al., 2015).

In addition to operating risks, the option for servitization increases operational complexity. Such complexity induces uncertainties (Valtakoski, 2017); it can increase because exist a lack of commitment to delivering the expected performance (Kowalkowski et al., 2015), and the servitization can interface with complex products (Baines et al., 2009). The companies can face up to lack of relevant human resources to organize (Baines et al., 2009; Gebauer et al., 2005; Kreye, 2017b); capacity to accurately predict needs before finalization of the contract (Kreye, 2017b); skills and knowledge (Smith et al., 2014); capacity to identify managerial ambivalence (Lenka et al., 2018); moreover, it is also necessary to increase contractual obligations (Bastl et al., 2012). The literature calls attention to complexities for offer service from internal organizational design, perceived cognitive limits, and social and cultural factors (Kowalkowski et al., 2012); of the resource bottleneck in product-centric manufacturers (Lütjen et al., 2017a); of the inability to change the traditional mental model of products for services (Lütjen et al., 2017a; Story et al., 2017). The negative consequences of this complexity and obstacles may reflect sterile relationships, lack of direction and coherence, opportunism, conflicts of interest, development of barriers from the network's rigidity, and an increase in complexities (Mustak, 2014).

2.2 Mitigation failure drivers

The literature indicates that an infusion of services may open up new business opportunities (Kindström et al., 2013). These new opportunities need to be profitable for both - the provider and the customer. However, companies that aim to seize the service opportunity face challenges and risks (Benedettini et al., 2015; Reim et al., 2016). The literature also shows that few companies are prepared to deal with servitization internal challenges (Benedettini et al., 2015). Such challenges are paradoxical (Kohtamäki et al., 2017). Manufacturers need tools and practices (Kohtamäki et al., 2017). Overcoming these organization paradoxes requires appropriate service-oriented structures to support solution delivery while maintaining effective operations in product and service units (Kamal et al., 2020; Kohtamäki et al., 2017). This unit of solutions could facilitate coping with the performance paradox - developing modular solutions to minimize production and delivery costs without sacrificing customization (Kohtamäki et al., 2017). Also, understanding development issues and difficulties between firms would be essential to understanding the reasons for failures that may lead to servitization failure (Valtakoski, 2017).

The literature reveals the importance of identifying and managing the operational and financial risks involved in the infusion of services (Kamal et al., 2020; Kowalkowski et al., 2015; Reim et al., 2016). Because service extensions can lead to an increased risk of bankruptcy. Managers need to be aware that service strategies' risks outweigh the benefits (Benedettini et al., 2015). The promise of achieving performance adds complexity and risk to the system vendor and the system, despite potentially higher returns (Kowalkowski et al., 2015). Companies need risk mitigation capabilities, long-term relationships with strong commitment, confidence, flexibility, willingness to share “gains and pains,” and avoiding excessive unplanned personalization (Kowalkowski et al., 2015). Also, support from the top manager and stakeholder engagement (Dmitrijeva et al., 2020). Organizations must have a clear overall plan, rules on the actions and practices that can drive this change (Huikkola et al., 2020). Besides, the mitigation of operational issues involves the implementation of the following business processes: 1. business processes that increase productivity; 2. processes that improve value for the customer; and 3. processes that enable innovation (Huikkola &

Kohtamäki, 2017); and/or by the implementation of the following structures: 1. production; 2. business analysis; 3. solution design; 4. network design of supplies; 5. infrastructure and resources; 6. operation; 7. support and 8. disposal, payment model and service (Brax & Visintin, 2017); can also mitigate the ability to manage information through connected, intelligent systems (Kamp et al., 2017; Kowalkowski et al., 2015); and/or servitization requires considerations of context factors such as 1. customers; 2. trust; 3. operational excellence (Dmitrijeva et al., 2020). The ability to master digital processes can strengthen the competitive position in costs (increased productivity) (Coreynen et al., 2017; Devece et al., 2017) or in differentiation (enhancing customer satisfaction) (Devece et al., 2017). Digitalization can also provide a steppingstone for manufacturers to expand their portfolio (Kamp et al., 2017); in this way, it can change the ways companies compete (modular architecture, scalable, quality plans, automated BackOffice processes) (Kowalkowski et al., 2015). However, the implementation of digitalization faces the following obstacles: progress in the use and performance of technological assets; increasing the capacity of data analysis (semantics and actuators) (Kamp et al., 2017); and need to adapt to the client's main technical processes (Coreynen et al., 2017).

Besides the risk, the literature calls attention to the increase in the complexity of the operations. This growth can be fueled by uncertainty in service management capabilities and integrated solutions (Valtakoski, 2017). Such uncertainties can be mitigated by increased collaboration and alignment between the customer and the solution provider (Dmitrijeva et al., 2020; Valtakoski & Witell, 2018). This collaboration can help companies manage the costs of providing services and increase profitability (Eggert et al., 2014), and it can also support the alignment of business logic, contributing to mitigating the risk of a service failure (Kowalkowski et al., 2017b). To overcome the issues is vital to convert knowledge as the basis for servitization processes. Tacit knowledge is key to the content of servitization; explicit knowledge is essential in structural terms. This conversion also requires dynamic capabilities that drive the business model at three levels: transaction content, transaction structure, and transaction governance (Forkmann et al., 2017). Also, the literature implies that they need to combine their capabilities, governance, and processes, such as: managing the installed base (understanding processes and customer usage), fusions and acquisitions, capacity development. The introduce service processes as reconfigurations of business models at three levels: transaction content, transaction structure, and transaction governance, and thus provide a systematic and granular understanding of the phenomenon of technology; project management capability; network partner management capability; capacity for co-creation of value (Huikkola & Kohtamäki, 2017; Kamal et al., 2020).

Organizations need to identify their design capabilities (what types of products and services can be designed) and, therefore, ensure that customer demands are met (Kamal et al., 2020). The modularization may be an option of the operations that can also mitigate the complexity, developing separate components, thus enabling the separate acquisition of these components (Carlborg & Kindström, 2014; Valtakoski, 2017). The transition of services is a resource-intensive enterprise, and companies must allocate financial, managerial, and personnel resources to the service business (Böhm et al., 2017). Big companies are more likely to have the resources and market power to make the necessary organizational adjustments. In turn, we could only identify enough configurations for revenue growth for large companies. For small businesses, it seems much more difficult to find a general recipe for service success. To increase their chances of growth with services, small businesses must anticipate and secure the allocation of adequate resources to the service business (Böhm et al., 2017). Figure 1 summarizes the study's perspective on possible drivers of service failure and ways to mitigate them.

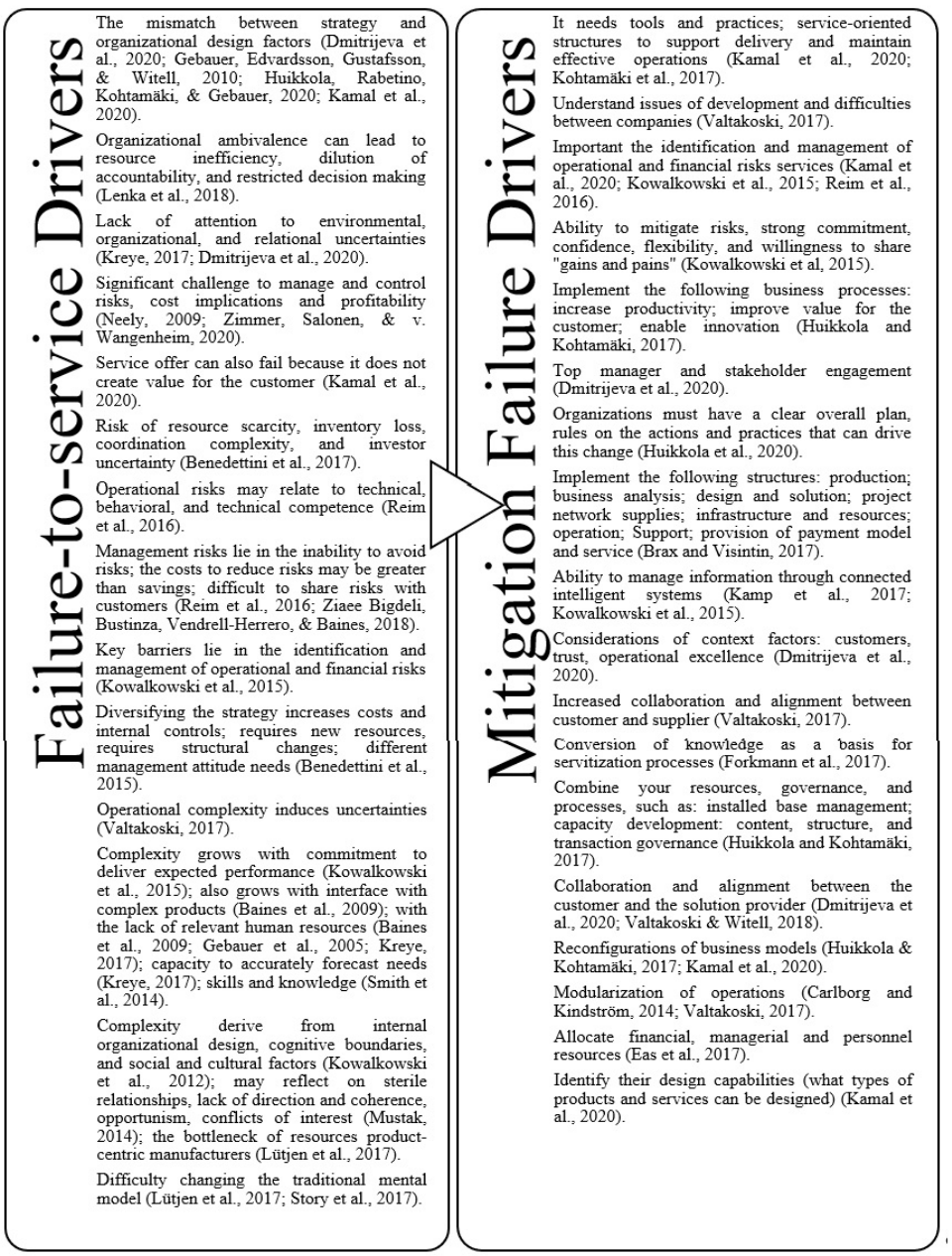

Figure 1. Literature perspectives on service failure drivers and ways of mitigation them.

3 Method

Although servitization studies are extensive, empirical research on servitization failure and factors to mitigate them seems to add to the literature. The study was carried out following an exploratory single-case approach to contribute to the deepening of the discussion regarding the failed servitization, its consequences, and means to mitigate them. A single case study can be a powerful example of contingent relationships and how they work (Siggelkow, 2007). The case study is a research strategy focused on understanding the dynamics present within a single scenario (Eisenhardt, 1989;

Martin et al., 2013). The case study methodology can enhance existing theory by pointing to gaps, filling in gaps, and also provides conceptual input when used as illustrations (Siggelkow, 2007). The case study in question required deep involvement because of the breadth and complexity. Key respondents were interviewed several times over time.

3.1 Case selection

The ElecLtd case provided an excellent opportunity to study a recent failure-to-service case that led the company to bankruptcy. Before servitization, this company maintained a representative market share (around 25%), sound financial position, and well-appreciated products in terms of performance and quality. After the bankruptcy, the company closed the service operation and reduced its number by 90%. In interviewing ElecLtd executives, the research team was able to gain a deep understanding of the drivers of service failure and possible ways to mitigate them. Due to the issue's breadth and complexity, the case study required deep and combined involvement by the research team, and vital interviewees were interviewed several times. Table 1 provides background information on participants' managerial experience and the number and duration of interviews. To support the systematic analysis of data, all interviews were recorded and transcribed in full. The research team collected an amount of other primary and secondary data (see Table 2).

Table 1. Interview details.

Interviewee position	Management experience	Role	Interview number and duration
ElecLtd Operations Manager	10 years	Responsible for industrial and service operations.	1 – 30 min 2 – 45 min 3 – 30 min
ElecLtd Administration Manager	15 years	Responsible for the administration department – (RH, Financial, Accounting).	4 – 45 min 5 – 25 min
ElecLtd Engineering Manager	8 Years	Responsible for the engineering department – Project Manager, Development.	6 – 30 min 7 – 50 min

Table 2. Secondary data and additional primary data collected.

Type	Document title
Report	Balance Sheet.
Contract template	Clients contracts.
Report	Profits & Losses report by year.
Guidelines	Process descriptions – (50 pages).
Report	Engineering projects.
Report	Productivity report.
Legal documents	Legal documents - customer complaints.
Contract template	Rental agreements - buildings, automobiles, equipment.

3.2 Data analysis

Data analysis used the principles of template coding (King, 2012). The initial coding model incorporated the utility failure drivers and ways to mitigate them to allow flexible and open coding to allow relevant themes to emerge from the data (Corbin & Strauss, 1990). The coding process was performed using AtlasTI software to identify and store quotes and interpretations as data items (or codes). These were collectively collapsed into a smaller number of categories (first-order themes) (King, 2012) and were labeled with an appropriately descriptive term (see Table 3 and Figure 2). New themes were added whenever the analysis identified items that did not fit the existing structure (Miles et al., 2014).

The first-order themes provided an initial understanding of the causes and possible solutions, which informed further classification by collapsing them into second-order themes. The data set was initially coded by one researcher and later crossed and ratified by two others; this researcher's triangulation was used to ensure the results (Denzin & Lincoln, 2000). The relationships among the various categories were interpreted using abductive reasoning to arrive at the “most likely” explanation (Mantere & Ketokivi, 2013). As the analysis unfolded, the coding structure was extended, refined, and empirically substantiated to generate the results. The initial coding Framework (with failure-to-service drivers and ways to mitigate them) was extended through an abductive iteration process between data, literature, and interpretation until clear top-level codes emerged. These codes were labeled as the third theme aggregated in the coding model. The results were structured as follows: failure-to-service drivers and ways to mitigate them.

3.3 Trustworthiness, credibility, and reliability

The combination of documents, observations, and data collected in the various interviews with the executive allowed the data triangulation. This triangulation was performed during data collection and analysis of the findings. The analysis was finalized when its saturation was reached (Yin, 2009). Specialists reviewed the study to allow future reproductions (Eisenhardt, 1989). The final analyzes and the discussion of the findings were always carried out at the researchers' meetings. The conclusions were discussed with the interviewees. Table 3 shows a strategy for validity and reliability measures during the research phases (Yin, 2014).

Table 3. Strategy for measures of validity and reliability during the research phases.

Validity criteria	Research Design	Case Selection	Data Collection	Data Analysis
Construct Validity.	Questions were developed based on an extensive review of the literature.	Not applicable.	They were collecting primary and secondary data as a source of information. Interviews lasted between 30 - 50 min, recorded, and transcribed.	The interviewees reviewed the case study protocol eliminate misunderstandings and ambiguities.
Internal validity.	Theoretical Framework.	Not applicable.	Factors that can lead to explanations and alternatives.	Pattern research; Triangulation of multiple sources of data. Discussion between authors to reach an inter-rater agreement.
External validity.	Documents, projects, public documents, technical visits.	Clear description of the company's case, its context, and situation.	Field observation, interviews, and secondary information.	Analytical generalization is based on emerging patterns in the information.
Reliability.	Develop case study protocol from primary, and secondary information.	Selection of a single developer case with multiple built-in analysis units based on predefined and registered criteria.	Shared questionnaire for all respondents with similar company status.	Involvement of a third author who was not involved in data collection.

4 Findings

The ElecLtd has identified the opportunity to diversify its revenue sources by entering the service business to combat customers' non-technical losses. These losses represent 34% of total customer production. ElecLtd's experience with services consisted of technical assistance based on installed products. ElecLtd had no experience with service delivery and took on many customers at the same time. This lack of experience contributed to using only its resources (financial, human, infrastructure). The ElecLtd entered the business without conducting business feasibility studies: volume, cost, price estimation, incentives, or payback. This lack of financial planning and estimates have contributed to over-sizing infrastructures and under-sizing displacement, food, and labour costs. Also, there were deficiencies in the management of the factory operation. Such shortcomings were replicated for a service operation. Based on the results, it is observed that the service process started and ended messy, inefficient, and wasting resources. The consequence of these issues was bankruptcy. File data show that at the beginning of the operation (2011), the company had 1200 employees. After the failure-to-service, the manufacturer needed to file for bankruptcy and dismiss 90% of its workforce.

4.1 Failure-to-service drivers

The ElecLtd has identified service requirements through bid proposals. File data show that the service operation's financial result in the first year closed 15% positive. In the following years, the losses were around the US $ 5.0 million per year. These accumulated losses of service consumed the working capital generated by the sale of products. As a result, ElecLtd faced difficulties selling and delivering products that accounted for 70% of sales. To mitigate this problem, ElecLtd managers have decided to reduce product prices to below cost. The purpose of this action was to generate an order portfolio to obtain working capital loans. The order portfolio increased absurdly (60% of Market Share). To aggravate the situation, problems to produce products widened. These problems were related to the lack of credit to acquire components. This decision was disastrous due to the loss of capacity to deliver the orders and decrease the product quality, culminating in the wear-and-tear relationship with the customers. Consequently, customers retaliated by disqualifying the product due to the rapid growth of non-delivery, delays, and the epidemic of quality problems. Below is an excellent testimonial:

> *Valuable amounts were paid to clients who went to court seeking compensation for damages - ElecLtd was massacred - the result was already bad after legal action financial losses were colossal* (Administration Manager).

In addition to these problems, the ElecLtd had serious misalignment problems among the board of directors. The headquarter did not control the actions carried out by the commercial director (it was evidenced those separate operations between the two companies): services commanded by the commercial director and factory by the owners of the company. This misalignment contributed to avoiding obtaining information and knowledge from the field service. The factory management was utterly unaware of what was happening to the outside service team. The product development team should receive information about product weaknesses. Despite the effort, the engineers of the factory did not receive any information from service teams. Besides, the lack of service process management and mapping contributed to operational efficiency issues. File data show that the daily productivity of the technical team (electricians) was around 50%. The service management was incompetent in

monitoring and executing actions to correct these deficiencies. These shortcomings contributed to the failure-to-service. The following are relevant testimonials:

> *Electricians spent a month at home waiting for work guidelines; other electricians stayed in the city of Manaus nothing to do and the company paying hotel, food and transportation fees - when they were questioned, they said that no one determined the activities for them - it was a mess* (Operation Manager).

> *ElecLtd had a complex mechanism of indicators; however, it was never taken seriously; look, it was just a proforma for ISO9000 audit* (Engineering Manager).

Another problem revealed was poor cost management. The ElecLtd was lenient in estimating product costs. This leniency entailed that price were established using guesswork. In addition to these issues, the company underestimated the complexity of service operations. The combination of lenient administrative processes, low-cost estimates, and lack of complexity contributed to wrong investment decisions. Also, file data reveals that the board of directors decided to close R & D projects, causing a loss of $ 8 million. The claim for closure was the loss of interest in the project. Besides, the manufacturer procrastinated actions to deal with responses to customer complaints.

Consequently, the manufacturer was disqualified from the list of suppliers due to problems of delivery and quality. Once detected that the losses were compromising the whole business, the ElecLtd decided to close the service operation. However, the manufacturer's contracts did not allow the close of the service operation without payment of contractual penalties. However, the ElecLtd did not have enough resources to pay the breach of contract. Also, customers did not make contracts more flexible. The ElecLtd had to operate at a loss until all contracts were finalized. Besides, the service process started and ended messy, inefficient, and wasting resources. To reduce expenses, the first action taken by ElecLtd was to dismiss all the managers and coordinators of the service operation. The second action was to delegate to people who did not know about the service operation. Third, the managers decided not to appoint a leader to conduct the decommissioning. Finally, all these actions contributed to losses of assets, resources, and deep financial losses. Below is an excellent testimonial.

> *My friend, it was a stupendous disaster... some examples: there was stealth of stocks and equipment; employees were out of work; neglected to finalize lease of buildings and vehicles; I don't know how much, but I guess they threw a fortune in the trash* (Administration Manager).

Respondents also indicated how to mitigate such problems and indicated ways to succeed. These indications contributed to the construction of a Framework for companies that intend to diversify their operations.

4.2 Ways to mitigation failure drivers

The interviews indicated mitigators to cope with the failure-to-service drivers. Such mitigators made it possible to build a Framework to prevent these failures from happening. This Framework encompasses two steps that must be performed before going live: “improving the service operation” and “knowing how to decommission”. Afterward, during implementation, the step indicates is “implementation”.

4.2.1 Service operation

Before going to life, firstly, the managers in charge of the service should focus on improving the service operation. They should pay attention to the requirements and deliveries agreed on in the contract. The results of this analysis can provide essential data to assess the available knowledge bases. Failure to assess internal capabilities may designate the operation to inexperienced employees or managers unable to implement the required changes. These management deficiencies can prevent a correct analysis of operational complexity and, especially, business process management. The following are relevant testimonials:

> *Our knowledge of service was small – also, the board of directors was arrogant* (Administration Manager).

Respondents indicated that to mitigate such problems involves recruiting experienced professionals. Besides, the development of operational partners can contribute to increasing the knowledge of internal teams. Such professionals and partners are essential for the correct sizing of resources and reducing operational complexity. Moreover, previous experience can contribute to applying the total quality business management further.

> *Partner could contribute to the increase in related to the service* (Enginneering Manager).

> *Experienced professionals could contribute to the analysis and implementation of organizational changes and control the productivity of resources* (Administration Manager).

4.2.2 Decommission

Respondents reported the harmful impacts of a lack of knowledge of how to decommission complex service operations. It is recommended to plan the decommissioning of the operation. Not knowing whom critical resources are and discontinuing them without prior analysis contributes to further negative impacts. Also, the lack of leadership to manage and execute can negatively affect the decommissioning of resources and contracts' closure. These negatives consequences may impact the relationship with customers and cause the loss of financial assets. Below is an excellent testimonial.

> *The experience I had with the decommissioning was terrible. We did not know what to do…lost much money* (Administration Manager).

The interviewees said that in a new operation, they would do everything differently. Also, discontinuing service operations is inevitable by forecast, or by the customer's decision, or by the supplier's decision. Therefore, it is recommended to have a road map and assess the risks and impacts. Know who the key employees are and plan how to maintain them. Finally, map the consultancies and professionals that have conducted a similar decommissioning process. Figure 2 shows the coding of the findings inserted in the “before going live” phase of the Framework.

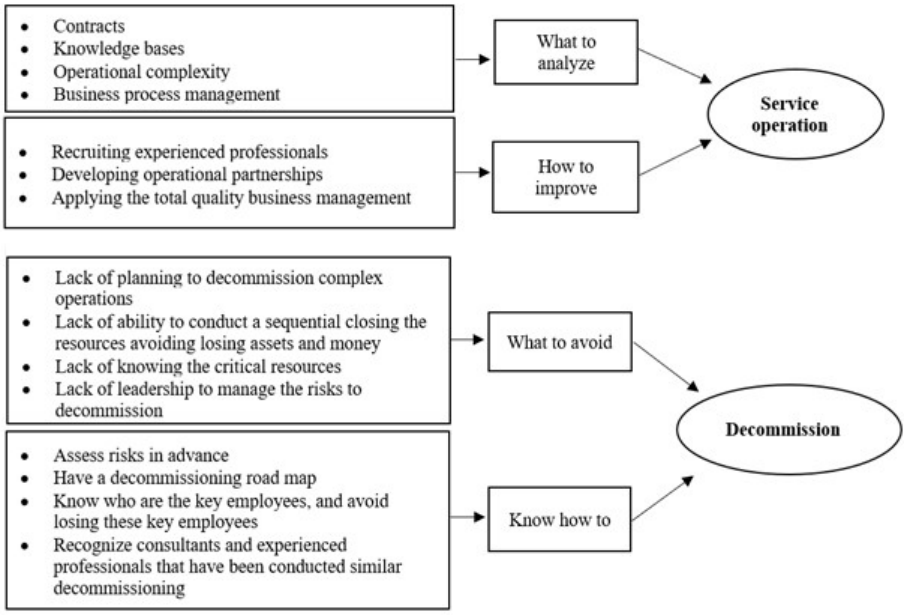

Figure 2. Coding of before going live findings.

4.2.3 Implementation

In the implementation, respondents indicated that they avoid keeping executives inexperienced and unable to implement change. Moreover, top managers cannot be content with weak or superficial analysis of operational and financial risks. Such analysis can contribute to misallocation decisions, as well as payback errors. Finally, respondents drew attention to weak information systems. Such deficiencies can affect the ability to monitor operations and make decisions. Also, the lack of capacity to manage the knowledge absorbed in implementation can hinder synergy from improving quality, develop new projects, and emerging business. Below is an excellent testimonial.

> *ElecLtd looked like two distinct divisions: production and sales/service. There was no collaboration between the divisions. Look, despite the insistence, engineering never received any information from field service. Terrible, this information could have been like "gold nuggets" for us* (Enginneering Manager).

Figure 3 shows the coding of the findings inserted in the "implementation" phase of the Framework.

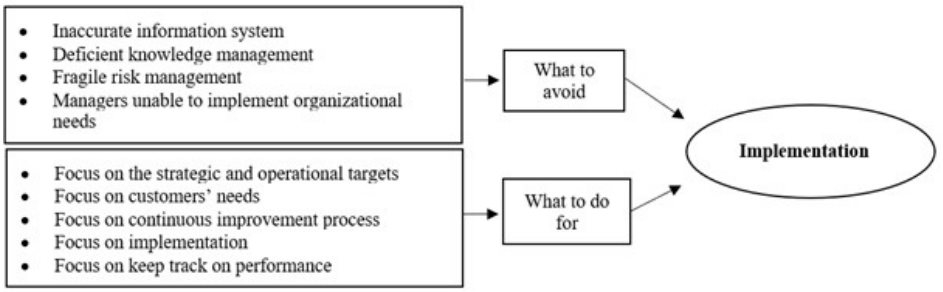

Figure 3. Coding of implementation findings.

The analysis of the identified steps and activities led to the development of a Framework (see Figure 4) to guide the actions of managers in charge of similar operations. Attention to these actions can increase the financial result, as well as strengthen the business diversification of manifesting companies.

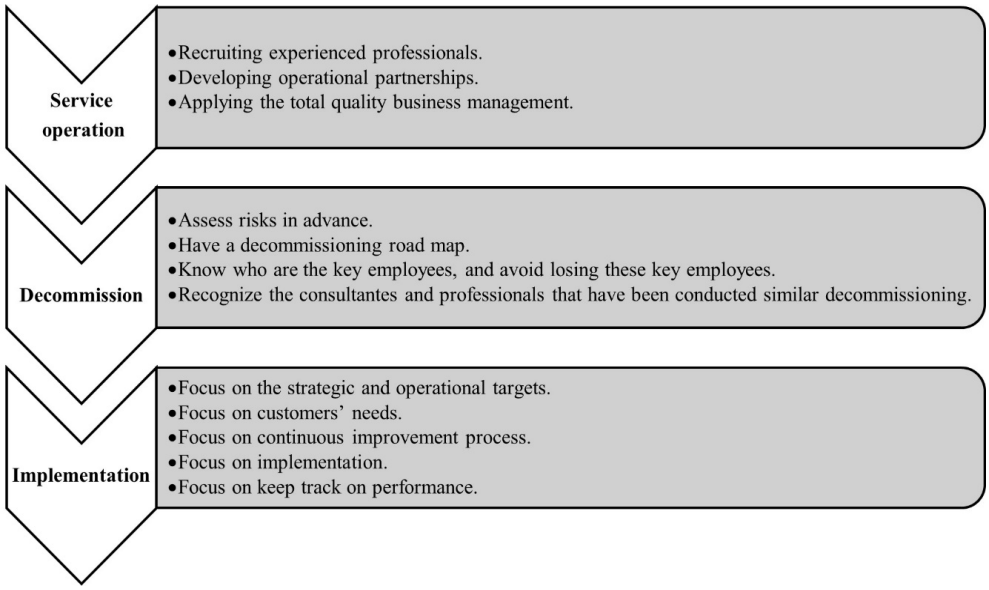

Figure 4. Framework steps to actions.

5 Conclusions

The present study intends to understand the drivers that influenced the failure-to-service and ways to mitigate them. The theoretical contribution contemplates three essential aspects of the failures-to-services and culminates in a Framework to guide the managers involved. First, the case presenting the factors that motivated the company to follow this strategy. Second, the study presents the problems of the servitization process that culminated in bankruptcy. As a third contribution, this study presents ways to mitigate failure-to-service drivers.

Findings indicate that failure-to-service drivers can be summarised by assigning the operation to inexperienced employees, lack of ability to implement organizational needs, organizational alignment, and knowledge of how to disable complex operations. The motivators identified and how to mitigate them made it possible to develop a Framework to guide managers involved in similar operations. The Framework is based on three stages two of them should be realized before going live: service operations and decommission. The third stage presents the actions in the implementation.

The Framework based on the executives' recommendations, points out that in the service operations stage should put the focus on the recruitment of experienced professionals. Such professionals could be found in competitors, as well as in the customers. Also, suggest developing of operational partnerships to obtain gains in knowledge and experience. Another suggestion is to implemented total quality management to achieve contract targets. In the decommissioning stage, the Framework indicates the need to assess risks in advance, prepare a deactivation roadmap, identify the key employees to avoid losing them and recognize consultants'

companies and qualified professionals who have already performed similar deactivations at other companies.

In the implementation stage, the Framework proposes to mitigate drivers' special attention to the company's focus, directing attention mainly to focus on strategic and operational goals, customer needs, continuous improvement, and the implementation and monitoring of performance. This proposed Framework aims to help companies develop better management of their service routine. Special attention to these actions can enable companies to minimize the impacts resulting from service failures. Also, minimizing failures allows companies to improve their financial results and strengthen the diversification of their businesses.

5.1 Research contributions

The findings contribute to recommending that underestimating the complexity of servitization constitutes an inducer to the failure-to-service. The lack of experience and qualification contributed to shortcomings in the management of the operation. This finding corroborates that the risk of failure increases due to deficiencies in the internal organization (Dmitrijeva et al., 2020; Kowalkowski et al., 2012; Reim et al., 2016), in human resources (Benedettini et al., 2015), in the knowledge and intellectual capacity (Kowalkowski et al., 2012; Valtakoski, 2017; Werlang & Rossetto, 2019), and social and cultural factors (Kowalkowski et al., 2012; Lenka et al., 2018).

Also, the results add indicating that staff was not aware of the organization's strengths and weaknesses. This deficiency led to a superficial analysis of contractual requirements (Kreye, 2017b; Reim et al., 2016); to an underestimation of knowledge management and complexity (Medeiros et al., 2020; Dmitrijeva et al., 2020; Kamal et al., 2020); and to an inefficiency in the business management process (Amarilla & Iarozinski, 2018; Huikkola et al., 2020; Kamal et al., 2020). Besides, these deficiencies helped intensify the financial losses resulting in the organization's failure (Benedettini et al., 2015).

As evidenced in the literature, the superficial analysis of the requirements did not reveal the risks of infusion of services that may outweigh the benefits (Benedettini et al., 2015). Besides, managers need to implement organizational changes to make the company more customer and service oriented (Benyoussef Zghidi & Zaiem, 2017; Gebauer & Kowalkowski, 2012; Huikkola et al., 2020). Another contribution these studies focus on managerial misalignment in the company. The findings contribute by indicating that such misalignment may lead to the failure-to-service. As noted, this misalignment was observed when the manufacturer did not take advantage of the knowledge management to improve the products (Forkmann et al., 2017; Kamal et al., 2020; Werlang & Rossetto, 2019); or when did not take in consideration the risks the to reduce the prices (Benedettini et al., 2015; Reim et al., 2016); or when it did not act to resolve the quality deficiencies (Gonzalez & Martins, 2015; Kreye, 2017a; Lütjen et al., 2017b).

The study also points out that managers who did not know how to decommission the service division. This finding contributes by indicating that these unknowns have contributed to increasing the effects of failure (Mustak, 2014; Werlang & Rossetto, 2019). The consequences directly impacted the loss of assets, financial losses, and resources contributing to the bankruptcy (Benedettini et al., 2015). As evidenced, errors were observed when the manufacturer did not plan further decommissioning (Valtakoski, 2017); or when designating people without proper knowledge

(Dmitrijeva et al., 2020; Valtakoski, 2017); or when managers were not capable of managing the valuable resources (Benedettini et al., 2015).

Moreover, the results of this study contribute by indicating actions to mitigate such failure-to-service drivers. The analysis of these actions allowed the creation of a Framework to guide top managers' actions interested in diversifying their manufacturing operations. The Framework suggests that problem-solving in-service operations should focus on the recruitment of experienced professionals. The top managers may also develop partnerships with other companies to mitigate further problems (Bikfalvi et al., 2013). Such actions may be an excellent source of knowledge and innovation (Huikkola & Kohtamäki, 2017; Rodriguez et al., 2016; Rönnberg Sjödin et al., 2016); besides, it can contribute to the understanding of the problem, the viability of the operation, and the delivery the needs (Kindström & Kowalkowski, 2014; Owen Raddats & Burton, 2014).

The Framework also focuses on planning the ordered sequence of shutdowns (Dmitrijeva et al., 2020). It suggests that the decommissioning process requires in advance to know who critical people are and recognize the consultants and experienced professionals in disconnecting from complex operations (Aarikka-Stenroos & Jaakkola, 2012). Finally, it suggests building a roadmap in advance detailing all these actions for the stakeholders to perform (Yildiz et al., 2014).

Finally, the Framework points out that implementation problems can be mitigated by developing a culture of excellent performance to generate the value expected by the client (Huikkola et al., 2020; Story et al., 2017); by daily management of relationship interaction: communication, conflict resolution, integration and collaboration of activities (Rhodes et al., 2016); by improving total quality: teamwork, focus on innovative process, outcome orientation, attention to detail (Diógenes et al., 2019); by a closer relationship with the client to develop open service innovation (Lütjen et al., 2017b); by planning the management process to achieve strategic objectives through analysis, modelling and process optimization to ensure keep on track on performance (Silva et al., 2019).

5.2 Managerial implications

The results of this study may contribute to managers responsible for the development of servitization processes. An infusion of services combined with products can reveal revenue growth opportunities. Managers interested in taking advantage of these opportunities need to identify their strengths, weaknesses, opportunities, and tendencies. It is also suggested to assess internal human resources' ability to determine whether their skills align with the requirements for service. Think about the possibility of creating a specific division to develop service. This division can be separated from the product division by contemplating a revenue and cost center. It is strongly recommended to establish qualified partnerships with other companies. These partnerships can provide the expertise, the necessary infrastructures, and qualified human resources. Besides, it will also be necessary for human resources management to identify competencies (knowledge, skills, and values) required to develop and deliver the service contract's specifications. Essential to promote a culture of excellent performance. Managers must be ruthless in identifying inefficiencies: unproductive human resources, waiting times, costs, and expenses out of the budget, delays in deliveries, different errors. This identification encompasses the application of continuous improvement techniques; the detailing of costs and expenses; the control

of employee efficiency; the development of efficient digitalization systems; the control of physical assets; the automation of processes; the narrowing of the relationship with customers to predict wear-and-tear signs in the relationship; and the search for product innovations. Finally, it is recommended that managers be aware of the requirements for decommissioning complex operations. As it turns out, the implications of the lack of decommissioning planning can impact the company. This lack of planning has led to a loss of tangible assets, a waste of resources, termination of contracts, problems in terminating employees, fines, and legal proceedings.

5.3 Limitations and future research opportunities

As with any study, the present research has limitations that must be addressed. As the study is qualitative, the results cannot be generalized for the population of manufacturers of high demand products. Moreover, the analysis of a single case of service failure that led the manufacturer to financial losses that conducted the ElecLtd to file for legal recovery prevented comparison with other cases.

Future studies may investigate: How to assess strengths, weaknesses, opportunities, and trends to achieve vertical integration for services? How to leverage the corporate mindset in the design and delivery phases of the service contract? How to promote the alignment of factory operations and services to take advantage of the knowledge acquired? How to mitigate the disconnect between the customer service demands and the actions of the service area managers of the manufacturer? How to develop decommissioning of complex service operations? Future studies can also evaluate the application of the Framework developed in other companies that develop similar services. Future studies can analyse applying the Framework and evaluate the results of its effectiveness in mitigating failure-to-services.

References

Aarikka-Stenroos, L., & Jaakkola, E. (2012). Value co-creation in knowledge intensive business services: a dyadic perspective on the joint problem solving process. *Industrial Marketing Management*, 41(1), 15-26. http://dx.doi.org/10.1016/j.indmarman.2011.11.008.

Amarilla, R. S. D., & Iarozinski, A., No. (2018). Comparative analysis of the main business processes of building companies in civil construction. *Gestão & Produção*, 25(2), 269-283. http://dx.doi.org/10.1590/0104-530x2406-16.

Baines, T. S., & Lightfoot, H. W. (2011) Towards an operations strategy for the infusion of product-centric services into manufacturing. In H. Demirkan, J. Spohrer & V. Krishna (Eds.), *Service systems implementation* (Service Science: Research and Innovations in the Service Economy). Boston: Springer. http://dx.doi.org/10.1007/978-1-4419-7904-9_6.

Baines, T., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E., & Swink, M. (2009). Towards an operations strategy for product-centric servitization. *International Journal of Operations & Production Management*, 29(5), 494-519. http://dx.doi.org/10.1108/01443570910953603.

Bastl, M., Johnson, M., Lightfoot, H., & Evans, S. (2012). Buyer-supplier relationships in a servitized environment. *International Journal of Operations & Production Management*, 32(6), 650-675. http://dx.doi.org/10.1108/01443571211230916.

Benedettini, O., Neely, A., & Swink, M. (2015). Why do servitized firms fail? A risk-based explanation. *International Journal of Operations & Production Management*, 35(6), 946-979. http://dx.doi.org/10.1108/IJOPM-02-2014-0052.

Benedettini, O., Swink, M., & Neely, A. (2017). Examining the influence of service additions on manufacturing firms' bankruptcy likelihood. *Industrial Marketing Management*, 60, 112-125. http://dx.doi.org/10.1016/j.indmarman.2016.04.011.

Benyoussef Zghidi, A., & Zaiem, I. (2017). Service orientation as a strategic marketing tool: the moderating effect of business sector. *Competitiveness Review*, 27(1), 40-61. http://dx.doi.org/10.1108/CR-02-2015-0012.

Bikfalvi, A., Lay, G., Maloca, S., & Waser, B. R. (2013). Servitization and networking: large-scale survey findings on product-related services. *Service Business*, 7(1), 61-82. http://dx.doi.org/10.1007/s11628-012-0145-y.

Böhm, E., Eggert, A., & Thiesbrummel, C. (2017). Service transition: a viable option for manufacturing companies with deteriorating financial performance? *Industrial Marketing Management*, 60, 101-111. http://dx.doi.org/10.1016/j.indmarman.2016.04.007.

Brax, S. A., & Visintin, F. (2017). Meta-model of servitization: the integrative profiling approach. *Industrial Marketing Management*, 60, 17-32. http://dx.doi.org/10.1016/j.indmarman.2016.04.014.

Carlborg, P., & Kindström, D. (2014). Service process modularization and modular strategies. *Journal of Business and Industrial Marketing*, 29(4), 313-323. http://dx.doi.org/10.1108/JBIM-08-2013-0170.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3-21. http://dx.doi.org/10.1007/BF00988593.

Coreynen, W., Matthyssens, P., & Van Bockhaven, W. (2017). Boosting servitization through digitization: pathways and dynamic resource configurations for manufacturers. *Industrial Marketing Management*, 60, 42-53. http://dx.doi.org/10.1016/j.indmarman.2016.04.012.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research* (pp. 428-444). London: Thousand Oaks.

Devece, C., Palacios, D., & Martinez-Simarro, D. (2017). Effect of information management capability on organizational performance. *Service Business*, 11(3), 563-580. http://dx.doi.org/10.1007/s11628-016-0320-7.

Diógenes, J. R. F., Queiroz, F. C. B. P., Queiroz, J. V., Furukava, M., Lima, N. C., & Souza, G. H. S. (2019). Quality culture in the Brazilian car dealerships. *Gestão & Produção*, 26(2), e2046. http://dx.doi.org/10.1590/0104-530X2046-19.

Dmitrijeva, J., Schroeder, A., Ziaee Bigdeli, A., & Baines, T. (2020). Context matters: how internal and external factors impact servitization. *Production Planning and Control*, 31(13), 1077-1097. http://dx.doi.org/10.1080/09537287.2019.1699195.

Eggert, A., Hogreve, J., Ulaga, W., & Muenkhoff, E. (2014). Revenue and profit implications of industrial service strategies. *Journal of Service Research*, 17(1), 23-39. http://dx.doi.org/10.1177/1094670513485823.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Journal*, 14(4), 532-550.

Finne, M., Brax, S., & Holmström, J. (2013). Reversed servitization paths: a case analysis of two manufacturers. *Service Business*, 7(4), 513-537. http://dx.doi.org/10.1007/s11628-013-0182-1.

Forkmann, S., Ramos, C., Henneberg, S. C., & Naudé, P. (2017). Understanding the service infusion process as a business model reconfiguration. *Industrial Marketing Management*, 60, 151-166. http://dx.doi.org/10.1016/j.indmarman.2016.05.001.

Gebauer, H., & Kowalkowski, C. (2012). Customer-focused and service-focused orientation in organizational structures. *Journal of Business and Industrial Marketing*, 27(7), 527-537. http://dx.doi.org/10.1108/08858621211257293.

Gebauer, H., Edvardsson, B., Gustafsson, A., & Witell, L. (2010). Match or mismatch: strategy-structure configurations in the service business of manufacturing companies. *Journal of Service Research*, 13(2), 198-215. http://dx.doi.org/10.1177/1094670509353933.

Gebauer, H., Fleisch, E., & Friedli, T. (2005). Overcoming the service paradox in manufacturing companies. *European Management Journal*, 23(1), 14-26. http://dx.doi.org/10.1016/j.emj.2004.12.006.

Gonzalez, R. V. D., & Martins, M. F. (2015). Competências habilitadoras da melhoria contínua: estudo de casos em empresas do setor automobilístico e de bens de capital. *Gestão & Produção*, 22(4), 725-742. http://dx.doi.org/10.1590/0104-530X1017-13.

Huikkola, T., & Kohtamäki, M. (2017). Solution providers' strategic capabilities. *Journal of Business and Industrial Marketing*, 32(5), 752-770. http://dx.doi.org/10.1108/JBIM-11-2015-0213.

Huikkola, T., Rabetino, R., Kohtamäki, M., & Gebauer, H. (2020). Firm boundaries in servitization: interplay and repositioning practices. *Industrial Marketing Management*, 90, 90-105. http://dx.doi.org/10.1016/j.indmarman.2020.06.014.

Kamal, M. M., Sivarajah, U., Bigdeli, A. Z., Missi, F., & Koliousis, Y. (2020). Servitization implementation in the manufacturing organisations: classification of strategies, definitions, benefits and challenges. *International Journal of Information Management*, 55(July), 102206. http://dx.doi.org/10.1016/j.ijinfomgt.2020.102206.

Kamp, B., Ochoa, A., & Diaz, J. (2017). Smart servitization within the context of industrial user–supplier relationships: contingencies according to a machine tool manufacturer. *International Journal on Interactive Design and Manufacturing*, 11(3), 651-663. http://dx.doi.org/10.1007/s12008-016-0345-0.

Kindström, D., & Kowalkowski, C. (2014). Service innovation in product-centric firms: a multidimensional business model perspective. *Journal of Business and Industrial Marketing*, 29(2), 96-111. http://dx.doi.org/10.1108/JBIM-08-2013-0165.

Kindström, D., Kowalkowski, C., & Sandberg, E. (2013). Enabling service innovation: a dynamic capabilities approach. *Journal of Business Research*, 66(8), 1063-1073. http://dx.doi.org/10.1016/j.jbusres.2012.03.003.

King, N. (2012). Doing template analysis. In G. Symon & C. Cassell (Eds.), *Qualitatve organizational research: core methods and current challenges*. London: Sage. http://dx.doi.org/10.4135/9781526435620.n24.

Kohtamäki, M., Rabetino, R., & Einola, S. (2017). Paradoxes in servitization. In M. Kohtamäki, T. Baines, R. Rabetino & A. Z. Bigdeli (Eds.), *Practices and tools for servitization: managing service transition* (pp. 185-199). Cham: Palgrave Macmillan. https://doi.org/10.1007/978-3-319-76517-4_10.

Kowalkowski, C., Gebauer, H., & Oliva, R. (2017a). Service growth in product firms: past, present, and future. *Industrial Marketing Management*, 60, 82-88. http://dx.doi.org/10.1016/j.indmarman.2016.10.015.

Kowalkowski, C., Gebauer, H., Kamp, B., & Parry, G. (2017b). Servitization and deservitization: overview, concepts, and definitions. *Industrial Marketing Management*, 60, 4-10. http://dx.doi.org/10.1016/j.indmarman.2016.12.007.

Kowalkowski, C., Kindström, D., Alejandro, T. B., Brege, S., & Biggemann, S. (2012). Service infusion as agile incrementalism in action. *Journal of Business Research*, 65(6), 765-772. http://dx.doi.org/10.1016/j.jbusres.2010.12.014.

Kowalkowski, C., Windahl, C., Kindström, D., & Gebauer, H. (2015). What service transition? Rethinking established assumptions about manufacturers' service-led growth strategies. *Industrial Marketing Management*, 45(1), 59-69. http://dx.doi.org/10.1016/j.indmarman.2015.02.016.

Kreye, M. E. (2017a). Can you put too much on your plate? Uncertainty exposure in servitized triads. *International Journal of Operations & Production Management*, 37(12), 1722-1740. http://dx.doi.org/10.1108/IJOPM-06-2016-0357.

Kreye, M. E. (2017b). Relational uncertainty in service dyads. *International Journal of Operations & Production Management*, 37(3), 363-381. http://dx.doi.org/10.1108/IJOPM-11-2015-0670.

Lenka, S., Parida, V., Sjödin, D. R., & Wincent, J. (2018). Towards a multi-level servitization framework. *International Journal of Operations & Production Management*, 38(3), 810-827. http://dx.doi.org/10.1108/IJOPM-09-2016-0542.

Lin, Y., Luo, J., Zhou, L., Ma, S., & Zhou, Z. (2011). Servitization strategy: Strategic priority, capacity requirement, and organizational feature. In *Proceedings of 2011 IEEE International Conference on Service Operations, Logistics and Informatics, SOLI 2011* (pp. 191-196). New York: IEEE. http://dx.doi.org/10.1109/SOLI.2011.5986554.

Luoto, S., Brax, S. A., & Kohtamäki, M. (2017). Critical meta-analysis of servitization research: constructing a model-narrative to reveal paradigmatic assumptions. *Industrial Marketing Management*, 60, 89-100. http://dx.doi.org/10.1016/j.indmarman.2016.04.008.

Lütjen, H., Tietze, F., & Schultz, C. (2017a). Service transitions of product-centric firms: an explorative study of service transition stages and barriers in Germany's energy market. *International Journal of Production Economics*, 192, 106-119. http://dx.doi.org/10.1016/j.ijpe.2017.03.021.

Lütjen, H., Tietze, F., & Schultz, C. (2017b). Service transitions of product-centric firms: an explorative study of service transition stages and barriers in Germany's energy market. *International Journal of Production Economics*, 192, 106-119. http://dx.doi.org/10.1016/j.ijpe.2017.03.021.

Mantere, S., & Ketokivi, M. (2013). Reasoning in organization science. *Academy of Management Review*, 38(1), 70-89. http://dx.doi.org/10.5465/amr.2011.0188.

Martin, S., Foulonneau, M., Turki, S., Ihadjadene, M., Paris, U., & Tudor, P. (2013). Risk analysis to overcome barriers to open data. *Electronic Journal of E-Government*, 11(1), 348-359.

Medeiros, S. A., Christino, J. M. M., Gonçalves, C. A., & Gonçalves, M. A. (2020). Relationships among dynamic capabilities dimensions in building competitive advantage: a conceptual model. *Gestão & Produção*, 27(1), e3680. http://dx.doi.org/10.1590/0104-530x3680-20.

Miles, M. B., Huberman, M. A., & Saldana, J. (2014). *Qualitative data analysis: a methods sourcebook*. Los Angeles: SAGE.

Mustak, M. (2014). Service innovation in networks: a systematic review and implications for business-to-business service innovation research. *Journal of Business and Industrial Marketing*, 29(2), 151-163. http://dx.doi.org/10.1108/JBIM-05-2013-0122.

Neely, A. (2009). Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*, 1(2), 103-118. http://dx.doi.org/10.1007/s12063-009-0015-5.

Owen Raddats, C., & Burton, J. (2014). Creating multi-vendor solutions: the resources and capabilities required. *Journal of Business and Industrial Marketing*, 29(2), 132-142. http://dx.doi.org/10.1108/JBIM-04-2012-0061.

Peillon, S., Dubruc, N., & Mansour, M. (2018). Service and customer orientation of corporate culture in a French manufacturing SME. *Procedia CIRP*, 73, 91-95. http://dx.doi.org/10.1016/j.procir.2018.03.331.

Raddats, C., Zolkiewski, J., Story, V. M., Burton, J., Baines, T., & Ziaee Bigdeli, A. (2017). Interactively developed capabilities: evidence from dyadic servitization relationships. *International Journal of Operations & Production Management*, 37(3), 382-400. http://dx.doi.org/10.1108/IJOPM-08-2015-0512.

Reim, W., Parida, V., & Sjödin, D. R. (2016). Risk management for product-service system operation. *International Journal of Operations & Production Management*, 36(6), 665-686. http://dx.doi.org/10.1108/IJOPM-10-2014-0498.

Rhodes, J., Lok, P., Loh, W., & Cheng, V. (2016). Critical success factors in relationship management for services outsourcing. *Service Business*, 10(1), 59-86. http://dx.doi.org/10.1007/s11628-014-0256-8.

Rodriguez, M., Doloreux, D., & Shearmur, R. (2016). Innovation strategies, innovator types and openness: a study of KIBS firms in Spain. *Service Business*, 10(3), 629-649. http://dx.doi.org/10.1007/s11628-015-0286-x.

Rönnberg Sjödin, D., Parida, V., & Kohtamäki, M. (2016). Capability configurations for advanced service offerings in manufacturing firms: using fuzzy set qualitative comparative analysis. *Journal of Business Research*, 69(11), 5330-5335. http://dx.doi.org/10.1016/j.jbusres.2016.04.133.

Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50(1), 20-24. http://dx.doi.org/10.5465/amj.2007.24160882.

Silva, J. C., Longaray, A. A., Munhoz, P. R., & Castelli, T. M. (2019). Using the view of Business Process Management (BPM) for process improvement in the shipping industry and offshore construction sector: a case study of the Rio Grande (RS) naval pole. *Gestão & Produção*, 26(4), e3909. http://dx.doi.org/10.1590/0104-530x3909-19.

Smith, L., Maull, R., & C.L. Ng, I. ((2014). Servitization and operations management: a service dominant-logic approach. *International Journal of Operations & Production Management*, 34(2), 242-269. http://dx.doi.org/10.1108/IJOPM-02-2011-0053.

Story, V. M., Raddats, C., Burton, J., Zolkiewski, J., & Baines, T. (2017). Capabilities for advanced services: a multi-actor perspective. *Industrial Marketing Management*, 60, 54-68. http://dx.doi.org/10.1016/j.indmarman.2016.04.015.

Valtakoski, A. (2017). Explaining servitization failure and deservitization: a knowledge-based perspective. *Industrial Marketing Management*, 60, 138-150. http://dx.doi.org/10.1016/j.indmarman.2016.04.009.

Valtakoski, A., & Witell, L. (2018). Service capabilities and servitized SME performance: contingency on firm age. *International Journal of Operations & Production Management*, 38(4), 1144-1164. http://dx.doi.org/10.1108/IJOPM-06-2016-0328.

Vandermerwe, S., & Rada, J. (1988). Servitization of business: adding value by adding services. *European Management Journal*, 6(4), 314-324. http://dx.doi.org/10.1016/0263-2373(88)90033-3.

Werlang, N. B., & Rossetto, C. R. (2019). The effects of organizational learning and innovativeness on organizational performance in the service provision sector. *Gestão & Produção*, 26(3), e3641. http://dx.doi.org/10.1590/0104-530x3641-19.

Yildiz, A. E., Dikmen, I., Birgonul, M. T., Ercoskun, K., & Alten, S. (2014). A knowledge-based risk mapping tool for cost estimation of international construction projects. *Automation in Construction*, 43, 144-155. http://dx.doi.org/10.1016/j.autcon.2014.03.010.

Yin, R. K. (2009). *Case study research: design and methods*. Thousand Oaks: Sage.

Yin, R. K. (2014), *Case study research: design and methods: design and methods*. London: Sage. Retrieved in 2019, December 9, from https://books.google.com/books?hl=en&lr=&id=AjV1AwAAQBAJ&pgis=1

Ziaee Bigdeli, A., Bustinza, O. F., Vendrell-Herrero, F., & Baines, T. (2018). Network positioning and risk perception in servitization: evidence from the UK road transport industry. *International Journal of Production Research*, 56(6), 2169-2183. http://dx.doi.org/10.1080/00207543.2017.1341063.

Zimmer, M., Salonen, A., & Wangenheim, F. V. (2020). Business solutions as market signals that facilitate product sales. *Industrial Marketing Management*, 91, 30-40. http://dx.doi.org/10.1016/j.indmarman.2020.07.014.