

# Lessons learned from a successful industrial product service system business model: emphasis on financial aspects

*Maicon Gouvêa de Oliveira*

Institute of Science and Technology, Federal University of Alfenas, Poços de Caldas, MG, Brazil

*Glauco Henrique de Sousa Mendes and Andrei Aparecido de Albuquerque*

Production Engineering Department, Federal University of São Carlos, São Carlos, SP, Brazil, and

*Henrique Rozenfeld*

Production Engineering Department, University of São Paulo, São Carlos, SP, Brazil

## Abstract

**Purpose** – The purpose of this study is to identify the elements of the product-service system (PSS) business model of a Brazilian company that has been running it for almost 50 years. It describes the PSS business model and gives special attention to the financial aspects of PSS implementation and to contingent factors of this emerging country.

**Design/methodology/approach** – The research is based on a single case study. Data have been collected through interviews and document analysis. Results and implications are obtained using Canvas framework to structure information and comparison between theory and practice.

**Findings** – Results described in this paper show that the PSS design and implementation can be strongly influenced by financial and contingent factors. This case indicates that the implementation of PSS business models can follow diverse paths and configurations to fit with companies' organizational features, local regulations and economic factors, including mixed transactional models and less demanding financial assessments.

**Originality/value** – This paper provides a roadmap of lessons learned from a multinational manufacturer that has been following the PSS business model for almost 50 years. This paper offers key insights concerning financial aspects and contingency factors that might influence servitization adoption.

**Keywords** Servitization, Product-service system, Emerging countries, Contingent factors, Business model, Financial aspects

**Paper type** Research paper

## 1. Introduction

Manufacturing companies have increasingly chosen to innovate by integrating services and products (Baines *et al.*, 2007; Kowalkowski, 2011; Kindström and Kowalkowski, 2014). This phenomenon, known as servitization, represents a strategy in which companies seek innovative capabilities and processes to create value through integrated solutions of goods and services (Baines *et al.*, 2009; Vandermerwe and Rada, 1988).

The adoption of servitization means a shift from products to product-service systems (PSSs). The motives, benefits and barriers of PSS and servitization have already been discussed (Tukker, 2004, 2015; Baines *et al.*, 2007; Baines *et al.*, 2009; Neto *et al.*, 2015). However, the implementation of a PSS requires further investigation. It is recognized that manufacturing companies moving toward this model require new service strategies (Gebauer *et al.*, 2008; Mathieu, 2001), new capabilities (Eloranta and Turunen, 2015; Gebauer *et al.*, 2013; Huikkola and Kohtamäki, 2017), and new organizational

structures and resources (Oliva and Kallenberg, 2003; Gebauer *et al.*, 2010; Kowalkowski *et al.*, 2015). Therefore, companies can follow diverse routes with different consequences in the configuration of strategy, structure and resources (Kowalkowski *et al.*, 2015; Raddats, Burton and Ashman, 2015). In summary, implementing servitization requires business model changes (Kindström, 2010; Storbacka *et al.*, 2013; Wallin *et al.*, 2013; Reim *et al.*, 2015).

Scarce research concerning business models is seen before the 1990s (Osterwalder and Pigneur, 2010; Coombes and Nicholson, 2013; Ehret *et al.*, 2013). Business models are an essential part of business strategy, demonstrating how companies create and deliver value (Chesbrough, 2003; Magretta, 2002; Teece, 2010). More specifically, a business model outlines the architecture of revenues and costs associated with the capabilities, resources, processes and

---

The authors would like to thank the São Paulo Research Foundation (FAPESP) for its financial support to this project. In addition, we also would like to thank the anonymous reviewers and the editor for their helpful comments.

Received 4 July 2016  
Revised 3 February 2017  
28 April 2017  
17 August 2017  
27 September 2017  
Accepted 10 October 2017

---

The current issue and full text archive of this journal is available on Emerald Insight at: [www.emeraldinsight.com/0885-8624.htm](http://www.emeraldinsight.com/0885-8624.htm)



Journal of Business & Industrial Marketing  
33/3 (2018) 365–376  
© Emerald Publishing Limited [ISSN 0885-8624]  
[DOI 10.1108/JBIM-07-2016-0147]

المنارة للاستشارات

structures (Chesbrough, 2007; Teece, 2010; Zott and Amit, 2010).

Business models dealing with PSS are of particular interest for researchers (Wang et al., 2011; Reim et al., 2015). Tukker's (2004) typology describes three different PSS business models: product-oriented services, use-oriented services and result-oriented services (Reim, Parida and Örtqvist, 2015). Although the literature describes cases of success with PSS, such as Rolls-Royce (Baines et al., 2007) and Tetra Pak (Meier et al., 2010), the design of PSS business models still demands attention (Meier et al., 2010; Storbacka et al., 2013).

Frameworks used in business models are useful for analysing companies' strategies, operations and relationships (Amit and Zott, 2001). Storbacka et al. (2013) present reasons for using business models to understand PSS. First, there is limited research detailing the transformational needs related to the implementation of a PSS. Second, the business model structure facilitates the comparison among various organizational contexts. Therefore, the use of business models supports the process of manufacturing companies implementing a PSS (Storbacka et al., 2013; Forkmann et al., 2017).

The financial aspects comprise a substantial part of business models. In fact, in Business Model Canvas, proposed by Osterwalder and Pigneur (2010), financial aspects underpin the overall business. This is one of the most recognized business model frameworks used to describe how companies create value. Financial aspects also represent an important part of successful PSS implementation. Although previous publications (Neely, 2008; Gebauer et al., 2012; Visnjic et al., 2016; Kohtamäki et al., 2015; Visnjic et al., 2016) have explored the relationship between PSS and firms' financial performance, there is lack of studies analysing PSS in terms of investment decisions and asset evaluation.

Further, the traditional PSS literature has focused on large companies, usually located in developed countries. Only few studies have addressed PSS business models for companies in emerging countries (Neely, 2008; Demeter and Szasz, 2013). Bao and Toivonen (2015) argue that generalizations about PSS based on developed countries may be misleading in emerging countries. Additionally, Lehmann and Prandini (2017) investigate how contingent factors (cultural and local) determine the configuration of service businesses of Swiss firms in China. Glas and Kleemann (2017) identify contingent factors of performance-based contracts, considering the specific-industry context. Therefore, there is a growing tendency to investigate whether contingent factors (i.e. national cultural values, economic conditions, national legislations etc.) influence PSS implementation.

In this context, the following research questions arise:

- RQ1. How do financial aspects affect the implementation of an industrial PSS in emerging countries?
- RQ2. What are the implications to other business model components when addressing PSS implementation in emerging countries?

This paper examines the case of a Brazilian company that has been running a PSS for nearly 50 years. It describes an overview the company's PSS business model and focuses on the financial aspects of PSS implementation and contingent factors of this

emerging country. The business model perspective is employed based on the Canvas framework proposed by Osterwalder and Pigneur (2010). This logic allows for an understanding of a PSS, providing an integrated representation that facilitates discussion without losing the complexities related to its implementation.

The following section of this paper presents a brief literature review. Section 3 describes the research design. The case is presented in Section 4 and managerial implications in Section 5. Finally, conclusions are presented.

## 2. Theoretical framework

### 2.1 Product-service system

Attention has been directed toward product-service system (PSS) benefits. Some benefits for customers are customized offers, greater satisfaction and the transfer of the product life cycle costs to the provider (Tukker, 2004; Cavaliere and Pezzotta, 2012; Baines and Shi, 2015). For providers, it can promote market and economic benefits, such as the facilitation of product sales, contribution to customer loyalty, creation of new revenue sources and maximization of profit margins (Baines et al., 2007; Baines et al., 2009; Baines and Shi, 2015). Lastly, if a PSS is sustainably designed, it can reduce environmental impacts (Mont, 2002; Ceschin, 2013; Tukker, 2015).

In addition, the implementation of a PSS faces significant cultural, corporate and financial challenges (Baines et al., 2007; Neely, 2008; Martinez et al., 2010). For example, Martinez et al. (2010) identify challenges in culture, integrated offers, internal processes and capabilities, strategic alignment and supplier relationships. Moreover, companies that invest in servitization can incur higher costs but often do not yield the expected higher returns; this financial challenge is called a service paradox (Gebauer et al., 2005).

Clearly, the complexity of changes depends on numerous internal and external variables, one of them being the type of PSS. Concerning this, the typology proposed by Tukker (2004) is one of the most accepted. It presents the following PSS types: product-oriented (PO), use-oriented (UO) and result-oriented (RO) systems, which can be also viewed as PSS business model types (Tukker, 2004; Tukker and Tischner, 2006). In the PO PSS business model, products are the main component of the sale offer, whereas services ensure the product functionality and durability. In the UO PSS model, the provider keeps product ownership and sells its function or use to customers. Lastly, in the RO PSS model, the PSS provider delivers a solution, result or competence that combines products, services and infrastructure rather than offering pure products or services. In UO and RO types, product ownership remains with the PSS provider.

These three PSSs are different in terms of creating, delivering and capturing value. Reim et al. (2015) identify a group of operational-level practices (related to contracts, marketing, networks, product/service design and sustainability) influencing the implementation of PSS business models. The choice, feasibility and effect of each practice relies on internal and external conditions, leading to a unique PSS business model (Reim et al., 2015). Neely et al. (2011) recognize different levels of complexity in these PSS types due to their

specific characteristics of value proposition, product extension, capabilities, partnership networks, financial flows, contracting and risks. Consequently, PSS implementation offers a new business model with degrees of transformation.

## 2.2 Business model

The business model concept has attracted attention from scholars and practitioners (Coombes and Nicholson, 2013). The definitions highlight the relationship between business model and value creation. In short, a business model defines how a company creates and delivers value to its customers and then converts earnings to profits (Teece, 2010).

A business model captures a company's strategy and articulates it with the architecture of revenues, costs and profits associated with the business processes, skills, relationships and resources (Shafer et al., 2005; Magretta, 2002). Several authors have suggested components (or elements) for business models. For example, Chesbrough and Rosenbloom (2002) highlight six components encompassing the market, organizational and financial architectures of a business model: value proposition, target markets, internal value chain structure, cost structure and profit model, value network and competitive strategy. Morris et al. (2005) state that the most common components are value proposition, customer, internal processes and the way the firm makes money.

Osterwalder and Pigneur (2010) present a framework, the Business Model Canvas, consisting of nine components: key partners, key activities, key resources, cost structure, value proposition, customer relationships, channels, revenue streams and customer segments. This study uses Business Model Canvas (Osterwalder and Pigneur, 2010) because the framework is well-recognized among scholars and practitioners.

Moreover, it has been used in several investigations concerning PSS business models (Barquet et al., 2013; Wallin et al., 2013; Eneberg and Holm, 2015). Table I shows the Business Model Canvas framework, including its components and their descriptions. Associations between the Canvas components and PSS are also listed in Table I, based on the following studies: Kindström (2010), Palo and Tähtinen (2011), Barquet et al. (2013) and Reim et al. (2015).

Companies implementing a PSS must change many elements of their business models. For instance, Storbacka et al. (2013) describe a transformational process followed by manufacturing companies toward a PSS business model. First, they propose to target customers and become knowledgeable about their processes, creating a specific value proposition. Second, they recommend the definition of integrated offers (technical elements, services other and system elements) and the change of revenue schemes to increase value capture. Next, they suggest establishing operational and organizational adaptability aligned to the offered value proposition and the desired cost structure. Finally, they indicate the orchestration of a network of internal and external actors to create and deliver value (Storbacka et al., 2013).

Particularly, PSS and servitization researchers have focused on several of these business model elements, e.g. the definition and evaluation of value propositions (Brady et al., 2005; Kowalkowski, 2010), the design of integrated solutions to provide such value (Pawar et al., 2009; Smith

Table I Structure of Business Model Canvas

Components	Descriptions
Customer segments	The different customer groups to reach and serve. For instance, mass market, niche market, segmented, diversified or multi-sided platforms
Value proposition	The bundle of products and services and their customer benefits that create value for a specific customer segment. For instance, performance, design, price, image, cost/risk reduction, accessibility or convenience/usability. In the case of PSS, value propositions can be asset recovery, asset availability, capital and risk reduction or capabilities
Customer relationships	The types of relationships between provider and its specific customer segments. For instance, dedicated personal assistance, self-service, automated services, communities or co-creation. In the use-oriented and result-oriented PSS business models, a close relationship is expected between provider and customer
Channels	The channels between provider and customers, describing how a company communicates with its customers and how the value proposition is delivered. For instance, sales force, web sales, own stores, partner stores or wholesaler
Revenue streams	How the company generates revenues from each customer segment. For instance, asset sale, usage fee, subscription fees, leasing, licensing, brokerage fees or advertising. The bidding approach for PSS requires a revision in terms of the customers' expectations of price and the provider's cost structure
Key resources	The resources necessary to create value for customers, including the most important assets required. For instance, PSS requires new assets and competences to offer and deliver value, which should be designed specifically for each PSS solution
Key activities	The set of critical activities and processes (i.e. production, sales, product development etc.) for running the business model. For instance, PSS critical activities related to design, manufacturing and delivery should be managed carefully to create and deliver value
Key partners	The value chain network that makes the business model work (i.e. suppliers, partners, strategic alliances or joint ventures). Alliances with other companies may be necessary to deliver value. In general, companies rely on partners to offer their PSS
Costs	All costs incurred to operate the business model. Large investments, long-term cashflow and long paybacks can be necessary to implement some use-oriented and result-oriented PSS business models

Sources: Adapted from Osterwalder and Pigneur (2010); Kindström (2010); Palo and Tähtinen (2011); Barquet et al. (2013); Reim et al. (2015)

et al., 2014), the configuration and balance among strategy, structure and resources (Gebauer et al., 2008; Kowalkowski et al., 2015) and the creation of a network of actors to deliver value (Nordin and Kowalkowski, 2010; Kowalkowski, 2011; Jaakkola, 2011). However, less attention has been dedicated to the financial aspects of PSS business models in the literature.

### 2.2.1 Financial aspects

The Business Model Canvas establishes the financial elements using the revenue model and cost structure. They are the foundations for a more detailed financial analysis concerning the business model viability and economic value creation.

Modigliani and Miller (1958) state that two criteria for investing under uncertainties are maximization of profits and maximization of market value. Both aim at maximizing value creation to shareholders. A commonly used measure of value creation is the economic value added (EVA<sup>®</sup>). O'Byrne (1999) described EVA<sup>®</sup> as the difference between the operational result, calculated on the basis of net operating profit after taxes (NOPAT), and the cost of the employed capital, which is estimated from the weight average cost of capital (WACC). The equation is  $EVA^{\text{®}} = \text{NOPAT} - (\text{WACC} \times \text{Invested Capital})$ . Thus, there are three relevant elements to determine the value of an investment: NOPAT, WACC and invested capital.

An investment should provide operational results in accordance with the risks inherent to its activities. Indeed, high returns on investment are expected for high risks. This premise is related to the risk-return paradox (Bowman, 1982). NOPAT is linked to the revenue streams of an investment, once it is a measure of operational results, and depends on revenues and operational cost structure. As a result, companies capable of delivering more stable and predictable revenue streams tend to have lower uncertainty in terms of NOPAT, which contributes to their value creation. Once PSS supports the formation of recurrent revenue streams, it is likely to affect EVA<sup>®</sup> positively.

In Table I, costs address topics for the implementation and maintenance of an investment (capital and operational expenditures). In the EVA<sup>®</sup> model, WACC considers the cost of capital on the basis of its different sources (internal: equity and external: debt). In developing economies, such as Brazil (Albuquerque and Valle, 2015), interest rates are elevated and external sources of capital are expensive. The risks involved in conducting business in unstable places also make the cost of equity more substantial (Assaf Neto, 2004). The cost and sources of capital are relevant aspects for investments in emerging economies, unlike in developed countries (Assaf Neto, 2004; Reddy, 2015a; Reddy et al., 2016). These facts affect the adoption of PSS in a developing country like Brazil.

High initial investments may be required in the case of UO and RO PSS models. This fact affects EVA<sup>®</sup> since high investments associated with high capital costs demand high NOPAT creation. If the goal for NOPAT is not achieved, EVA<sup>®</sup> becomes negative (Albuquerque and Valle, 2015). In addition, UO and RO PSSs with high investments tend to present similar features of uncertain businesses, such as energy generation. Then, high investments represent a substantial barrier for PSS models if other sources of capital were not addressed. Despite this fact, the expectations of long-term, stable revenues are positive aspects in UO and RO PSS business models.

Finally, as Barquet et al. (2013) stated, high initial investments associated with long-term cash flows extend the payback period. This characteristic is a result of the fact that earnings come from rents rather than sales. The existence of long-term cash flows with small incomes is also involved with the risk-return paradox (Bowman, 1982).

## 3. Research design

The present exploratory research studied the PSS business model implemented by a Brazilian company. Therefore, a qualitative case research approach was used as the research strategy (Gebauer et al., 2012). According to Yin (2003), case research permits investigation of a phenomenon in a real context through an in-depth analysis. This research strategy is also appropriate to answer research questions in theory-building research (Eisenhardt, 1989; Reddy, 2015a; 2015b).

This research also aligns with abductive case-based research and was loosely guided by theoretical constructs (Dubois and Gadde, 2002). Although there were basic theoretical constructs, they were not fully imposed. Inspired by other relevant works (Baines et al., 2009; Gebauer et al., 2010; Kowalkowski et al., 2015), this research focused on how the collected evidence could influence the PSS theory, especially related to financial and contingent challenges of implementing PSS business models in emerging countries. Indeed, data analysis was an iterative process of matching and clarifying theory and reality, a characteristic of the abductive research process (Dubois and Gadde, 2002).

Table II summarizes the research design elements, and a further explanation about them is presented in the following sections.

### 3.1 Case selection

For confidentiality purposes, we refer to the company as "J Company". The company is the Brazilian subsidiary of a leading global corporation in technology solutions for food processing (i.e. it provides solutions for fruit and vegetable processing, freezing, refrigeration etc.) and air transportation industries (solutions for airports and military equipment). The corporation is present in more than 50 countries, and it employs more than 3,000 people. Specifically, J Company, the Brazilian subsidiary designs and manufactures high-value capital equipment for food processing, especially orange juice processors. It provides equipment and services for all Latin America, and it employs around 350 people.

Moreover, J Company has adopted a PSS business model for its core product line, the citrus juice extractor, since its launch approximately 50 years ago. J Company was selected for several reasons:

- it is the market leader in its segment, dominating 75 per cent of the global market share;
- it began applying the PSS approach before the concept had started as a research field; and
- it is a case of resulted-oriented PSS and thus demonstrates a full description of a PSS business model.

The case study had multiples respondents, providing different views about the same phenomenon (Neto et al., 2015). There are advantages and disadvantages of using this research strategy (Reddy, 2015a; Yin, 2003). The most important advantage of single case study is the in-depth data collection, which supports the identification of details often missed in multiple case studies. This method permits a deep research enquiry and comes as close as possible to the research phenomena. In contrast, a single case approach limits the generalization of results and may suffer from biases from researchers and the company's employees involved (Voss et al., 2002).

Table II Research design elements

Elements	Description
General research question	How could financial aspects affect the implementation of an industrial PSS in emerging countries?
Research context	Investigation of the components of PSS business models in emerging countries, in particular the financial aspects. There is a lack of information concerning PSS business models in emerging countries, which hinders the understanding of the contingent factors affecting the PSS implementation in this context
Sample case	A Brazilian capital equipment manufacturer that has been achieving success through a well-established PSS business model. Research case based on an in-depth analysis of a single case
Data Collection	Analysis of the company's public and internal documents and execution of semi-structured interviews through workshops, conducted by a group of researchers in two phases. Interviewees were senior managers of the investigated company
Data Analysis	Data was collected and organized based on the research constructs and Canvas framework and then followed by a comparative analysis between theory and practice
Triangulation	Data collected from several sources and researchers were grouped and compared to reach a consolidated version

### 3.2 Data collection protocol

Data collection occurred in two instances. The first one was implemented through a four-hour workshop carried out at J Company's facilities. This first workshop focused on collecting data regarding the overall PSS business model. In the second instance of data collection, J Company's senior managers were invited to participate in another workshop: an eight-hour focus group discussion. The objective of this instance was to clarify information from the first workshop and to discuss challenges specifically concerning PSS financial aspects and Brazilian contingent factors that could impact PSS adoption for other Brazilian companies. These workshops were guided through topics of interest for the research, similar to the protocol used for semi-structured interviews. This approach allowed for several participants from J Company and members of the research group to participate at the same time (Kindström and Kowalkowski, 2009), which contributed to data triangulation and refinement.

Participants were senior managers with high-level positions in the company, representing different organizational units and with more than 15 years of work experience at J Company. Specifically, the chief executive officer (CEO), the chief financial officer (CFO) and the chief operation officer (COO) participated. The choice for a multidisciplinary team of managers (from different functional areas) and researchers (in management, engineering and accountability disciplines) in both data collection instances enabled unique perspectives.

Following Yin (2003), a research protocol was developed to ensure research reliability in data collection. The protocol

consisted of data collection procedures and an interview question guide. The first workshop was organized around the how and why the J Company decided to offer PSS, the benefits and challenges and the most relevant managerial practices and business configurations employed in the PSS model. Interview questions such as those given below reflect the theory presented in Section 2:

- Q1. What is the bundle of product and services that is offered to the clients?
- Q2. What is the value proposition offered to the client?
- Q3. How has J Company organized operations to deliver this PSS?
- Q4. What are the main benefits and risks involved in PSS offer?

In the second workshop, questions (examples given below) addressed financial practices and context-specific barriers towards PSS offers:

- Q5. How is the financial performance of PSS measured?
- Q6. In terms of accountability, how does the company handle a high volume of investment on assets to enable PSS operation?

### 3.3 Data analysis

Data were recorded in researchers' personal protocols, allowing consistent descriptions. Additionally, J Company's reports and other documents (organization charts, process maps and operating protocols) referenced by respondents were analysed. Then, primary and secondary data was grouped into similar themes based on the research constructs and theoretical framework. In this case, Canvas framework was used to categorize the data and capture elements that appeared essential to the success of the citrus juice extractor PSS business model. To minimize bias, the researchers involved in this study selected quotes to support their research insights.

Qualitative research should avoid misrepresentation and misunderstanding through triangulation techniques. Reddy (2015a) describes four types of triangulation techniques (data, investigator, theory and methodological triangulation). Two of them were applied in this study (see Table II). The use of different data sources enabled further understanding of the investigated phenomenon, requiring data triangulation (Eisenhardt, 1989). Moreover, validity was also achieved by using the investigator triangulation technique, which involves multiple researchers reaching a certain degree of internal validity (Denzin, 2006). Based on the research analysis, contributions to theory and managerial practices were provided (Eisenhardt, 1989; Voss et al., 2002).

## 4. Results

### 4.1 Citrus juice extractor business model

J Company produces the citrus juice extractor equipment for the global market. There are different models and production performances (from 225 to 600 pieces of fruit per minute),

which embrace a variety of citrus fruits. Although the product price is significant when compared to the cost of raw materials (fruits), it becomes insignificant when compared to the loss caused by an interruption in the juice production process. As a result, extraction performance is important. The CEO stated:

[...] we process 75% of the global orange juice. For this, we offer approximately 2.500 juice extractors with capacity to extract 600 oranges per minute and working seven months per year. We have 900 units in operation only in Brazil.

The citrus juice extractor business model is a result-oriented PSS business model. The solution comprises the product (citrus juice extractor) and its integrated services. The extractors are rented on contracts in which J Company retains its property and customers pay a monthly fee for its use (which can vary with the processing volume) and a bonus according to the achieved performance. The company provides the following services as part of this contract: technical assistance, installation, optimization of production performance based on fruit specifications, training of employees in the product operation and internal services such as laboratory tests to determine fruit specifications. Beyond these services, the company also provides remanufacturing services to update product technologies and optimize performance.

Although the company has no direct responsibility for the product operation (the customer's staff operates the juice extractors), they clearly have a decisive role in achieving the productivity of juice extraction. Indeed, the volume processed affects earnings. This fact enhances the value perception and reinforces the partnership between the PSS provider (J Company) and its customer.

The following sections describe the citrus juice extractor business model according to the Business Model Canvas framework.

#### 4.1.1 Customer segments

The business model explores a business-to-business customer segment formed primarily by large citrus processing companies. The COO reported:

[...] we have different contracts: there are units (factories) with just two extractors, but we mainly work with big factories with more than 150 extractors. For these customers, we also have a technical team giving full assistance in locus.

Therefore, this PSS business model benefits from a niche positioning and from a complex product and service offer. In fact, the PSS provider is willing to have a close relationship with its customers. Nevertheless, the company also attends to, in minor scale, small and medium citrus processing companies, adjusting its offers as needed.

#### 4.1.2 Value proposition

The value proposition comprises a product-based value (product performance and quality), service-based value (customization and consistency) and relationship-based value (trust and long-term commitment). According to the COO, "The equipment evolved in operational performance since it is applied to a mass production industry. Thus, the extractor cannot stop working. Its availability rate reaches 99.5 per cent." The CFO added;

[...] we want to offer solutions to our customers, support after sales and other services with quality [...] we do not want to provide only the equipment and, after do no profit with services. This is not our strategy.

Thus, the best suitable combination of value seems a critical competitive advantage for this market segment. The main benefits offered through this PSS model are as follows:

- availability (owing to product quality, fast technical assistance and product customization);
- customization (customized parts of extractors to fit fruit specifications);
- quality (enhanced by additional product-related services); and
- operational cost reduction (customers can focus on core activities, transferring operational tasks to the PSS provider).

As a result, owing to the provider's expertise in juice extraction, the customer keeps its operational costs at a minimum level.

#### 4.1.3 Customer relationships

J Company invests in open channels to listen to customer demands concerning contract adjustments, product customization and new services. The behaviour of the technical teams who work directly with the customers (interacting on a daily basis) also has a great influence on developing trusting, long-standing relationships. According to the COO, "They are our image in the customers' home, representing our company in a differentiated way. For this, we help service teams to provide good services." The CFO gave another example about the system payment that represents this emphasis on relationship. Although the processing volume directly affects revenues, there is no automated monitoring control. The real volume of processed fruits is established on the basis of the information exchanged and adjusted between the PSS provider and customer.

#### 4.1.4 Channels

Because availability is central to the value proposition and equipment interruptions have a strong impact on customer operation, the company prepares logistic and support plans to reduce time out of operation, including maintenance, customization or remanufacturing activities. Whereas other manufacturing companies rely on external actors to ensure service delivery (Kindström, 2010), J Company invests in a vertical integration strategy. Thus, J Company's service teams are the main channel between customers and the company.

#### 4.1.5 Revenue streams

The revenue mechanism is based on renting contracts associated with a productivity bonus. The standard contracts include technical assistance and operational training services, but other types of services such as laboratory tests and counselling services about types of equipment and engineering services can be added to address customers' needs. Contracts last from two to three years (two to three fruit harvests).

Revenue includes a fixed monthly fee and a variable fee linked to the processing volume. To minimize risks, J Company and customers can ask for contract adjustments, concerning the processed volume during the harvest. According to the CFO, in the case of large harvests, J Company increases revenue, but it also tends to have more maintenance costs, requiring contract adjustments. This emphasizes a need to understand the company's cost structure for product maintenance. Unexpected cost increases caused by new levels of production can reduce

profitability in the short term and value creation in the long term.

Further, J Company's contracts include advanced revenue mechanisms based on productivity bonuses linked to the processing performance. Findings indicate that as the business model evolved, the revenue system has changed from simple extractor renting to productivity mechanisms. The CFO said:

[...] in the past we had many more extractors installed than we have nowadays. However, we continue to process the same amount of orange juice. This is good for the customer due to the improvements of equipment performance and for us because we can diminish the asset used for business and financial assessments.

Therefore, the contract type adopted in this PSS business model promotes partnership between the PSS provider and customers through risk and gain sharing and a trade-off between revenue and costs.

#### 4.1.6 Key resources

J Company requires resources to support its PSS business model. Operand resources are typically physical and financial resources (i.e. equipment, goods, raw material etc.), whereas operant resources are usually intangible resources such as information, knowledge and skills (i.e. employee skill, service competence etc.) (Vargo and Lusch, 2004). Among them, a key resource is the human resource with an expertise in citrus processing and product maintenance.

#### 4.1.7 Key activities

The study of the citrus juice extractor business model revealed a set of key processes. Despite the fact that providing services has been seen as essential to the success of the juice extractor business model, J Company seems to continue being a product-centric company. Therefore, product development is one of the most critical processes, because it underpins the offer of a robust product, which is critical to avoiding excessive maintenance. The COO of J Company said:

[...] the operational performance, monitored by the service team, is great. Nevertheless, this information returns to our engineering team that supports new improvements and innovations in the extractors. We also invest in the development of new kits (e.g., different filters for removing pulp fruit) to attend customer needs, allowing new features for the installed extractors. However, since we work with a large base of products installed in our customers' sites, there are limits to the degree of innovation we can do.

The PSS provider has invested to achieve high performance levels in this process, employing methods such as robust design and total productive maintenance (TPM).

As previously mentioned, customer service processes have an important role. They deal with the front-end customer's experience and product usage. J Company has teams of experts in product maintenance and supporting services that manage services during the product usage phase. Thus, they can easily learn about customer needs, which leads to offering of additional services and noticing potential contract adjustments. Nevertheless, new service development follows an unstructured process.

The findings also highlight that financial processes are relevant for PSS success, especially when it is offered in Brazil where interest rates and legislation have large influence on businesses. First, the capital asset (juice extractors) significantly impacts the return on investment. According to the CFO:

[...] it is a challenge to discuss returns on investment. However, our business model started a long time ago with only a few extractors in a single customer, and thus, with a relatively low investment. After this, continuously new extractors were aggregated year-by-year in our portfolio

until reaching the current number [...]. I would say that if our company had decided to start this business today, they would hardly think in the same way due to the huge investment required, long paybacks and involved risks like cash flow, payments and customers. Another important risk is the capital cost in Brazil. Regarding this, we always think about reducing our capital in the face of the difficulties to reach an attractive return on investment.

Despite this, the PSS business model has proved to be profitable for J Company.

Regarding tax legislation, there are different possibilities to fit the PSS model into the Brazilian laws, because taxes change in terms of the transactional model employed. For example, renting contracts are taxed differently from service contracts and from traditional product sale. In this case, J Company decided to follow a renting model rather than the service model, resulting in lower taxes. Therefore, issues related to capital investment, its return, interest rates and tax legislation seem crucial to PSS implementation. They can either enhance the organizational interest in PSS or block its employment.

#### 4.1.8 Key partners

J Company has no significant dependence of external partners to run its PSS. They employ their own collaborators for providing services. According to the COO, the provision of an integrated offer requires information and intensive knowledge exchanges. Thus, their own staff can better perform these tasks. This strategy benefits the position of J Company in the value chain, supporting its focus on large customers and, hence, facilitating interfirm collaboration, development of customer-focused attitudes and promotion of a deep knowledge about the customer's operation.

#### 4.1.9 Cost structure

The cost structure was designed to support the accounting issues related to the maintenance of the product property, even with products located at customers' location. In addition, companies need to be capable of estimating costs of aggregated services and dealing with recurring revenue streams established by contracts linked to processing volumes and productivity bonus.

Figure 1 shows the main features of the citrus juice extractor business model.

## 5. Managerial implications

The first managerial implication refers to marketing aspects. Benefits of servitization are assumed to exist for all companies. However, circumstances will differ, thus influencing the servitization process. J Company has taken advantage of its installed base of products to explore a niche market, developing roles of availability and performance provider (Kowalkowski et al., 2015). The company attempted to introduce PSS into other product lines but without success. Low market share and market fragmentation were two key reasons of failure to expand the PSS. Therefore, manufacturers should be aware of market conditions (including customers' needs and value proposition) before implementing a PSS model.

A second implication is that manufacturing companies need to improve their relational capabilities. Cooperation with customers enables better knowledge about their needs and processes, generating opportunities for improved product and service offers. It also enhances manufacturers' understanding about their product-service offers (Kindström, 2010; Kohtamäki et al., 2013). J Company demonstrates that external

Figure 1 Main features of PSS business model

Key partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
<ul style="list-style-type: none"> <li>No relevant partners</li> </ul>	<ul style="list-style-type: none"> <li>Product and manufacturing development</li> <li>Technical Assistance</li> <li>Accounting</li> <li>Finance</li> </ul>	<ul style="list-style-type: none"> <li>Product functionality</li> <li>Customization</li> <li>Quality</li> <li>Reduced Operational Costs</li> </ul>	<ul style="list-style-type: none"> <li>Long-standing contracts</li> <li>Trust</li> <li>Partnership</li> </ul>	<ul style="list-style-type: none"> <li>Business-to-Business</li> <li>Customers of a food processing market</li> <li>Mainly the major market players</li> </ul>
	<b>Key Resources</b> <ul style="list-style-type: none"> <li>Capital assets</li> <li>Expertise in food processing</li> <li>Expertise in product development, manufacturing and maintenance</li> </ul>		<b>Channels</b> <ul style="list-style-type: none"> <li>Agile logistics</li> <li>Own technical assistance</li> </ul>	
<b>Cost Structure</b> <ul style="list-style-type: none"> <li>Remain product property</li> <li>Costs of services aggregated to the product</li> <li>Recurrent revenue streams</li> </ul>		<b>Revenue Streams</b> <ul style="list-style-type: none"> <li>Result oriented PSS</li> <li>Long-term contracts with recurrent revenue</li> <li>Monthly fee adjusted in terms of processing volume and productivity</li> </ul>		

relationships based on dimensions such as trust, open interaction and shared commitment play a central role. Concerning internal relationships, technical assistance plays a critical role in this PSS model, ensuring customer satisfaction during the product usage, providing aggregated services and bringing information to other functional areas (sales, manufacturing and product development). The findings show that loyal front-end employees are better in developing relationships with customers. On the other hand, strategic partners are of no importance in this case and servitization is implemented using vertical integration strategy.

From an implementation point of view, a third implication refers to the process of transition to services. The assumption that manufacturers undertake a linear trajectory along a product-service continuum is well propelled (Oliva and Kallenberg, 2003). However, in line with other works (Storbacka et al., 2013; Kowalkowski et al., 2015), this research describes a business model that was born as a PSS and does not follow this traditional path. In J Company, the PSS model has been defined according to customers' needs and contract types; it still provides equipment on rent with basic product-oriented services in parallel to more advanced services. The gradual and smooth development in J Company shows that different types of business models can co-exist in the same organization (including different versions of PSS and traditional business models). It is also noteworthy that the PSS implementation in J Company has not demanded changes in the organizational structure and culture as stated by studies in this area (Oliva and Kallenberg, 2003; Gebauer et al., 2010; Martinez et al., 2010). Although some elements were developed (i.e. long-term customer relationships, product and process data acquiring, relational capabilities, product-related services and sophisticated revenue mechanisms), its culture has remained mainly product-oriented and the company has neither designed nor implemented any separate structure or process to implement a successful PSS model.

### 5.1 Managerial implications related to financial aspects and contingency factors

Regarding the financial analysis, the rent of extractors (without transferring the product ownership and without involving a

financial agent) demands a new mindset in terms of how to evaluate financial statements and ratios. Firstly, there is a negative cash flow in the early years of PSS, which is expected in business with long-term payback periods. Moreover, when a company decides to keep property, a higher level of immobilization (physical assets) is introduced to its balance sheet, negatively affecting financial measures. For example, the return-on-assets (ROA) has an increase in the denominator (assets) while the numerator (earnings) remains low, resulting in a worse ROA. However, it should be noticed that this impact is temporary owing to the depreciation of extractors in the balance sheet. J Company's CEO said, "After the depreciation period, the profitability become[s] very high due to the recurring revenue and the extended product lifecycle achieved through technical assistance and remanufacturing processes."

In this sense, this model presents relevant barriers for short-term views owing to the high initial investment and long payback period, but it also presents a great potential of profitability in the long term. These short-term barriers were minimized in J Company because investments were spread over many years. In terms of the potential of value creation, the interviewees claimed the technological development supported the improvement of extractor's performance, which allowed for reducing the number of machines and, consequently, the capital asset installed at the customers' end. As a result, EVA<sup>®</sup> was positively impacted, accelerating the maximization of financial return over the years. The existence of continuous revenue streams established by renting contracts is another positive point. The streams are less affected by marketing instabilities and contribute with a consistent NOPAT, which minimize risks and can justify lower profitability on short-term perspectives based on the risk-return paradox (Bowman, 1982).

It should be noted that modern business models are considering success measures other than financial measures to ensure business sustainability in the long term. These other forms of measures are related to customers' loyalty and satisfaction, brand recognition, opportunities for creation of new markets, etc. PSS models seem to present an outstanding potential to create value in these other forms, being capable of capturing value through diverse marketing strategies. For



example, a PSS model with closely related and well-satisfied customers can charge premium prices, have a facilitated market entrance for new products and services in the same value chain, trade customer information with partners and block new competitors, among other competitive advantages.

A last managerial implication can shed light on the contingency factors that can influence the design and implementation of a PSS business model. Besides these well-known servitization and PSS barriers, it is important to recognize contingency factors (mainly external factors). In this case, the results reveal that, in Brazil, different tax laws are applicable for contracts of product use when compared to the standard transactional model. Another factor is the high cost of capital as those mentioned by senior managers. These factors could create difficulties in the adoption of PSS model for Brazilian manufacturing firms. Although the cost of capital in Brazil is among the highest in the world, the CFO stated that approximately 60 per cent of J Company's income is achieved through the PSS business model and that they are satisfied with the current profitability. This fact can be a signal of the potential of this business model and how it can be financially successful in the long term.

## 6. Conclusion

Based on an empirical case, the article's contributions are threefold. First, it contributes to the PSS literature by analysing the financial aspects of PSS. In this case, it discusses how PSS influences asset evaluation, economic value creation and return of investment decisions, which are essential for understanding the impact of PSS on firms' performance. Second, it contributes by identifying contingent factors affecting PSS implementation in emerging countries like Brazil. Although some factors influencing PSS implementation are more manageable and influenced by a company's decisions, others are external and unmanageable, such as macroeconomic conditions, tax regulations and legislation. Third, it provides practical implications related to market conditions and organizational elements, highlighting practices to enhance the success of PSS implementation. To conclude, although this article highlights many managerial implications, it also includes theoretical contributions concerning the financial aspects and contingent factors related to PSS implementation.

This study presents limitations. Although triangulation techniques were employed to increase data robustness, data collected from interviews can suffer from personal bias. In addition, findings are limited to a single research case undertaken in a capital goods manufacturing company. Then, there is no space for generalizations.

Several opportunities for future research can be identified through this study. Firstly, it is reasonable to state that there are different paths for manufacturing companies that want to servitize. This paper presents a PSS that was established organically without moving from a product-based approach. Therefore, the understanding of the different service growth trajectories (organic versus traditional transition path) is one opportunity for further research. Secondly, companies may expand their competitive options, running different business models concurrently. Thus, another research opportunity is the integrated management of PSS and non-PSS business models in

the same organization. Thirdly, the case demonstrates how legislation and economic factors can inhibit PSS implementation. Hence, studies related to factors influencing the diffusion of servitization in specific contexts should be stimulated. Lastly, more studies concerning the impacts of servitization on financial statements and business evaluations are demanded.

## References

- Albuquerque, A.A. and Valle, M.R. (2015), "Capacity of future earnings' prediction of EVA<sup>®</sup> in the Brazilian public companies", *International Business Research*, Vol. 8 No. 1, pp. 38-49.
- Amit, R. and Zott, C. (2001), "Value creation in e-business", *Strategic Management Journal*, Vol. 22 Nos 6/7, pp. 493-520.
- Assaf Neto, A. (2004), *Contribuição ao Estudo da Avaliação de Empresas no Brasil: Uma Aplicação Prática*, São Paulo University, São Paulo.
- Baines, T.S. and Shi, V.G. (2015), "A Delphi study to explore the adoption of servitization in UK companies", *Production Planning and Control*, Vol. 26 Nos 14/15, pp. 1171-1187.
- Baines, T.S., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E. and Swink, M. (2009), "Towards an operations strategy for product-centric servitization", *International Journal of Operations & Production Management*, Vol. 29 No. 5, pp. 494-519.
- Baines, T.S., Lightfoot, H.W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A. and Tiwari, A. (2007), "State-of-the-art in product-service systems", *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, Vol. 221 No. 10, pp. 1543-1552.
- Bao, S. and Toivonen, M. (2015), "Cultural differences in servitization: nordic manufacturers in China", *Journal of Science & Technology Policy Management*, Vol. 6 No. 3, pp. 223-245.
- Barquet, A.P.B., de Oliveira, M.G., Amigo, C.R., Cunha, V.P. and Rozenfeld, H. (2013), "Employing the business model concept to support the adoption of product-service systems (PSS)", *Industrial Marketing Management*, Vol. 42 No. 5, pp. 693-704.
- Bowman, E.H. (1982), "Risk seeking by troubled firms", *Sloan Management Review*, Vol. 23 No. 4, pp. 33-42.
- Brady, T., Davies, A. and Gann, D.M. (2005), "Creating value by delivering integrated solutions", *International Journal of Project Management*, Vol. 23 No. 5, pp. 360-365.
- Cavaliere, S. and Pezzotta, G. (2012), "Product-service systems engineering: state of the art and research challenges", *Computers in Industry*, Vol. 63 No. 4, pp. 278-288.
- Ceschin, F. (2013), "Critical factors for implementing and diffusing sustainable product-service systems: insights from innovation studies and companies' experiences", *Journal of Cleaner Production*, Vol. 45, pp. 74-88.
- Chesbrough, H. (2003), "The era of open innovation. MIT", *Sloan Management Review*, Vol. 44 No. 3, pp. 35-41.
- Chesbrough, H. (2007), "Business model innovation: it's not just about technology anymore", *Strategy & Leadership*, Vol. 35 No. 6, pp. 12-17.
- Chesbrough, H. and Rosenbloom, R.S. (2002), "The role of the business model in capturing value from innovation:

- evidence from Xerox corporation's technology spin-off companies", *Industrial and Corporate Change*, Vol. 11 No. 3, pp. 529-555.
- Coombes, P.H. and Nicholson, J.D. (2013), "Business models and their relationship with marketing: a systematic literature review", *Industrial Marketing Management*, Vol. 42 No. 5, pp. 656-664.
- Demeter, K. and Szasz, L. (2013), "Towards solution based thinking: characteristics of servitization at Hungarian manufacturing companies", *Journal for East European Management Studies*, Vol. 18 No. 3, pp. 309-335.
- Denzin, N. (2006), *Sociological Methods: A Sourcebook*, 5th ed., Aldine Transaction.
- Dubois, A. and Gadde, L.E. (2002), "Systematic combining", *Journal of Business Research*, Vol. 55 No. 7, pp. 553-560.
- Ehret, M., Kashyap, V. and Wirtz, J. (2013), "Business models: impact on business markets and opportunities for marketing research", *Industrial Marketing Management*, Vol. 42 No. 5, pp. 649-655.
- Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.
- Eloranta, V. and Turunen, T. (2015), "Seeking competitive advantage with service infusion: a systematic literature review", *Journal of Service Management*, Vol. 26 No. 3, pp. 394-425.
- Eneberg, M. and Holm, L.S. (2015), "From goods to service logic: service business model requirements in industrial design firms", *The Design Journal*, Vol. 18 No. 1, pp. 9-30.
- Forkmann, S., Ramos, C., Henneberg, S.C. and Naudé, P. (2017), "Understanding the service infusion process as a business model reconfiguration", *Industrial Marketing Management*, Vol. 60, pp. 151-166.
- Gebauer, H., Bravo-Sanchez, C. and Fleisch, E. (2008), "Service strategies in product manufacturing companies", *Business Strategy Series*, Vol. 9 No. 1, pp. 12-20.
- Gebauer, H., Fleisch, E. and Friedli, T. (2005), "Overcoming the service paradox in manufacturing companies", *European Management Journal*, Vol. 23 No. 1, pp. 14-26.
- Gebauer, H., Paiola, M. and Edvardsson, B. (2012), "A capability perspective on service business development in small and medium-sized suppliers", *Scandinavian Journal of Management*, Vol. 28 No. 4, pp. 321-339.
- Gebauer, H., Paiola, M. and Saccani, N. (2013), "Characterizing service networks for moving from products to solutions", *Industrial Marketing Management*, Vol. 42 No. 1, pp. 31-46.
- Gebauer, H., Edvardsson, B., Gustafsson, A. and Witell, L. (2010), "Match or mismatch: strategy-structure configurations in the service business of manufacturing companies", *Journal of Service Research*, Vol. 13 No. 2, pp. 198-215.
- Glas, A.H. and Kleemann, F.C. (2017), "Performance-based contracting: contextual factors and the degree of buyer supplier integration", *Journal of Business & Industrial Marketing*, Vol. 32 No. 5, pp. 677-692.
- Huikkola, T. and Kohtamäki, M. (2017), "Solution providers' strategic capabilities", *Journal of Business & Industrial Marketing*, Vol. 32 No. 5, pp. 752-770.
- Jaakkola, E. (2011), "Unraveling the practices of 'productization' in professional service firms", *Scandinavian Journal of Management*, Vol. 27 No. 2, pp. 221-230.
- Kindström, D. (2010), "Towards a service-based business model – key aspects for future competitive advantage", *European Management Journal*, Vol. 28 No. 6, pp. 479-490.
- Kindström, D. and Kowalkowski, C. (2009), "Development of industrial service offerings: a process framework", *Journal of Service Management*, Vol. 20 No. 2, pp. 156-172.
- Kindström, D. and Kowalkowski, C. (2014), "Service innovation in product-centric firms: a multidimensional business model perspective", *Journal of Business & Industrial Marketing*, Vol. 29 No. 2, pp. 96-111.
- Kohtamäki, M., Partanen, J. and Möller, K. (2013), "Making a profit with R&D services – the critical role of relational Capital", *Industrial Marketing Management*, Vol. 42 No. 1, pp. 71-81.
- Kohtamäki, M., Hakala, H., Partanen, J., Parida, V. and Wincent, J. (2015), "The performance impact of industrial services and service orientation on manufacturing companies", *Journal of Service Theory and Practice*, Vol. 25 No. 4, pp. 463-485.
- Kowalkowski, C. (2010), "What does a service-dominant logic really mean for manufacturing firms?", *CIRP Journal of Manufacturing Science and Technology*, Vol. 3 No. 4, pp. 285-292.
- Kowalkowski, C. (2011), "The service function as a holistic management concept", *Journal of Business & Industrial Marketing*, Vol. 26 No. 7, pp. 484-492.
- Kowalkowski, C., Windahl, C., Kindström, D. and Gebauer, H. (2015), "What service transition? Rethinking established assumptions about manufacturers' service-led growth strategies", *Industrial Marketing Management*, Vol. 45 No. 1, pp. 59-69.
- Lehmann, R. and Prandini, M. (2017), "After sales in China", *Proceedings of the Spring Servitization Conference (SSC 2017)*, Lucerne, pp. 12-15.
- Magretta, J. (2002), "Why business models matter", *Harvard Business Review*, Vol. 80 No. 5, pp. 86-92.
- Martinez, V., Bastl, M., Kingston, J. and Evans, S. (2010), "Challenges in transforming manufacturing organisations into product-service providers", *Journal of Manufacturing Technology Management*, Vol. 21 No. 4, pp. 449-469.
- Mathieu, V. (2001), "Service strategies within the manufacturing sector: benefits, costs and partnership", *International Journal of Service Industry Management*, Vol. 12 No. 5, pp. 451-475.
- Meier, H., Roy, R. and Seliger, G. (2010), "Industrial product-service systems – IPS2", *CIRP Annals – Manufacturing Technology*, Vol. 59 No. 2, pp. 607-627.
- Modigliani, F. and Miller, M.H. (1958), "The cost of Capital, corporation finance and the theory of investment", *The American Economic Review*, Vol. 48 No. 3, pp. 261-297.
- Mont, O. (2002), "Clarifying the concept of product-service system", *Journal of Cleaner Production*, Vol. 10 No. 3, pp. 237-245.
- Morris, M., Schindehutte, M. and Allen, J. (2005), "The entrepreneur's business model: toward a unified perspective", *Journal of Business Research*, Vol. 58 No. 6, pp. 726-735.
- Neely, A. (2008), "Exploring the financial consequences of the servitization of manufacturing", *Operations Management Research*, Vol. 1 No. 2, pp. 103-118.
- Neely, A., McFarlane, D. and Visnjic, I. (2011), "Complex service systems – identifying drivers characteristics and success

- factors”, *18th International Annual EurOMA Conference, Exploring Interfaces, 3-6 July, Cambridge University Press, Cambridge, MA*, p. 74.
- Neto, G.Z., Pereira, G.M. and Borchardt, M. (2015), “What problems manufacturing companies can face when providing services around the world?”, *Journal of Business & Industrial Marketing*, Vol. 30 No. 5, pp. 461-471.
- Nordin, F. and Kowalkowski, C. (2010), “Solutions offerings: a critical review and reconceptualisation”, *Journal of Service Management*, Vol. 21 No. 4, pp. 441-459.
- O’Byrne, S.F. (1999), “EVA and its critics”, *Journal of Applied Corporate Finance*, Vol. 12 No. 2, pp. 92-96.
- Oliva, R. and Kallenberg, R. (2003), “Managing the transition from products to services”, *International Journal of Service Industry Management*, Vol. 14 No. 2, pp. 160-172.
- Osterwalder, A. and Pigneur, Y. (2010), *Business Model Generation*, Wiley, Hoboken.
- Palo, T. and Tähtinen, J. (2011), “A network perspective on business models for emerging technology-based services”, *Journal of Business & Industrial Marketing*, Vol. 26 No. 5, pp. 377-388.
- Pawar, K.S., Beltagui, A. and Riedel, J.C.K.H. (2009), “The PSO triangle: designing product, service and organisation to create value”, *International Journal of Operations & Production Management*, Vol. 29 No. 5, pp. 468-493.
- Raddats, C., Burton, J. and Ashman, R. (2015), “Resource configurations for services success in manufacturing companies”, *Journal of Service Management*, Vol. 26 No. 1, pp. 97-116.
- Reddy, K.S. (2015a), “Beating the odds! build theory from emerging markets phenomenon and the emergence of case study research – a ‘test-tube’ typology”, *Cogent Business & Management*, Vol. 2 No. 2, pp. 16-25.
- Reddy, K.S. (2015b), “The state of case study approach in mergers and acquisitions literature: a bibliometric analysis”, *Future Business Journal*, Vol. 1 Nos 1/2, pp. 1-22.
- Reddy, K.S., Xie, E. and Huang, Y. (2016), “Contractual buyout – a legitimate growth model in the enterprise development: foundations and implications”, *International Journal of Management and Enterprise Development*, Vol. 15 No. 1, pp. 1-23.
- Reim, W., Parida, V. and Örtqvist, D. (2015), “Product-service systems (PSS) business models and tactics – a systematic literature review”, *Journal of Cleaner Production*, Vol. 97 No. 15, pp. 61-75.
- Shafer, S.M., Smith, H.J. and Linder, J.C. (2005), “The power of business models”, *Business Horizons*, Vol. 48 No. 3, pp. 199-207.
- Smith, L., Maull, R. and Ng, I.C.L. (2014), “Servitization and operations management: a service dominant-logic approach”, *International Journal of Operations & Production Management*, Vol. 34 No. 2, pp. 242-269.
- Storbacka, K., Windahl, C., Nenonen, S. and Salonen, A. (2013), “Solution business models: transformation along four continua”, *Industrial Marketing Management*, Vol. 42 No. 5, pp. 705-716.
- Teece, D.J. (2010), “Business models, business strategy and innovation”, *Long Range Planning*, Vol. 43 Nos 2/3, pp. 172-194.
- Tukker, A. (2004), “Eight types of product-service system: eight ways to sustainability? Experiences from SusProNet”, *Business Strategy and the Environment*, Vol. 13 No. 4, pp. 246-260.
- Tukker, A. (2015), “Product services for a resource-efficient and circular economy – a review”, *Journal of Cleaner Production*, Vol. 97 No. 15, pp. 76-91.
- Tukker, A. and Tischner, U. (2006), “Product-services as a research field: past, present and future. Reflections from a decade of research”, *Journal of Cleaner Production*, Vol. 14 No. 17, pp. 1552-1556.
- Vandermerwe, S. and Rada, J. (1988), “Servitization of business: adding value by adding services”, *European Management Journal*, Vol. 6 No. 4, pp. 314-324.
- Vargo, S.L. and Lusch, R.F. (2004), “Evolving to a new dominant logic for marketing”, *Journal of Marketing*, Vol. 68 No. 1, pp. 1-17.
- Visnjic, I., Wiengarten, F. and Neely, A. (2016), “Only the brave: product innovation, service business model innovation, and their impact on performance”, *Journal of Product Innovation Management*, Vol. 33 No. 1, pp. 36-52.
- Voss, C., Tsiriktsis, N. and Frohlich, M. (2002), “Case research in operations management”, *International Journal of Operations & Production Management*, Vol. 22 No. 2, pp. 195-219.
- Wallin, J., Chirumalla, K. and Thompson, A. (2013), “Developing PSS concepts from traditional product sales situation: the use of business model canvas”, *Product-Service Integration for Sustainable Solutions*, Springer Berlin Heidelberg, pp. 263-274.
- Wang, P.P., Ming, X.G., Li, D., Kong, F.B., Wang, L. and Wu, Z.Y. (2011), “Status review and research strategies on product-service systems”, *International Journal of Production Research*, Vol. 49 No. 22, pp. 6863-6883.
- Yin, R.K. (2003), *Case Study Research: Design and Methods*, 3rd ed., Sage Publications, Newbury Park; London.
- Zott, C. and Amit, R. (2010), “Business model design: an activity system perspective”, *Long Range Planning*, Vol. 43 Nos 2/3, pp. 216-226.

### Further reading

- Kowalkowski, C., Gebauer, H. and Oliva, R. (2017), “Service growth in product firms: past, present, and future”, *Industrial Marketing Management*, Vol. 60, pp. 82-88.

### About the authors

**Maicon Gouvêa de Oliveira** is a Professor of Technology and Innovation Management at the Institute of Science and Technology, Federal University of Alfenas, Poços de Caldas, MG, Brazil. He has co-authored papers published in management journals, such as *R&D Management Journal*, *Technological Forecasting and Social Change*, *Industrial Marketing Management*, *International Journal of Technology Intelligence and Planning*, and *Product: Management and Development*. His research interests include new product and service development, product-service systems, roadmapping, front-end of innovation, decision making and portfolio management.

**Glauco Henrique de Sousa Mendes** is a Professor of Quality Management, Quality Service and Service Innovation at the Federal University of São Carlos, Department of Production Engineering. He has written books on quality management in Brazil and published several scientific papers in journals such as *Journal of Service Management*, *International Journal of Quality & Reliability Management* and *Concurrent Engineering Research and Applications*. His research interests include new product and service development, product-service systems, servitization, front-end of innovation and quality management. Glauco Henrique de Sousa Mendes is the corresponding author and can be contacted at: [glauco@dep.ufscar.br](mailto:glauco@dep.ufscar.br)

**Andrei Aparecido de Albuquerque** is a Professor of Finance at the Department of Industrial Engineering, Federal University of São Carlos (UFSCar), Brazil. He has co-authored papers published in management, business,

accounting and finance journals such as *Independent Journal of Management & Production*, *International Business Research* and *Journal of Cleaner Production*. His research interests include financial strategies, financial performance, capital structure, cost of capital and value creation.

**Henrique Rozenfeld** holds a Master of mechanical engineering from the University of São Paulo (USP), Brazil, and a Doctorate from WZL RWTH Aachen, Germany. Since 1982, he is a Full Professor in manufacturing integration area at School of Engineering of São Carlos (EESC) of USP, Brazil. He was a Visiting Professor of WZL Aachen, Germany, and the University of Missouri, USA, in 1995 and 2003, respectively. His current research interests include product life-cycle management, planning innovation (front-end), management and business process modelling and eco-design design for environment.

---

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgroupublishing.com/licensing/reprints.htm](http://www.emeraldgroupublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.