

A theoretical framework for pricing product-service systems.

Mario Rapaccini, Filippo Visintin

University of Florence
Information Based Industrial Services Laboratory
Department of Energy Engineering “Sergio Stecco”
Via Cesare Lombroso 6/17
50134, Florence, Italy
{mario.rapaccini, filippo.visintin}@unifi.it

Abstract. Using case based research, we developed a framework to devise the pricing practices for product service systems. We discussed the contextual factors that drive the adoption of a given pricing practice. We used the servitization level of a manufacturing company to explain why different practices are adopted by firms that servitized their business in different ways.

Keywords: pricing, servitization, product-service system, product-service, PSS.

1 Introduction

A generalized decrease of the returns on product’s sale, coupled with an increased focus on customer satisfaction, have been encouraging a rising number of companies to supplement their product offerings with services both before and after the sale. The rationale for this integration stems from the benefits that these services can generate [2], [14]. First and foremost, product services can generate substantial revenues and profits. These revenues can be hidden on a mark-up on product’s price, as well as explicit and coming from the sale of services, in isolation from the product. Moreover, they can provide a stable source of cash flows, being more resistant to the economic cycles that drive investments and equipment. In addition to these financial benefits, product services can give rise to several competitive benefits. Firstly, they can provide differentiation, making products more appealing. Such a benefit is particularly relevant in mature mass-markets, where low-cost competitors provoke fierce price competitions, especially if products are easy to copy and patents offer only limited protection against copying. Secondly, product services can help achieve customer satisfaction, especially when products are complex and customers very service-demanding. Thirdly, by providing services it is possible to build strong, close, and positive relationships with customers. These relationships, in addition to increase customer (true) loyalty, allow the providers to collect reliability data as well as suggestions and complaints about the products and/or the services. These information help design products and/or services more tailored to the customers’ needs and devise

effective recovery actions whenever customers' expectations are not met. Finally, being labour-intensive, services are less easy to imitate, and therefore represent a more sustainable source of competitive advantage. The shift from selling manufactured goods to offering packages of products and product-related services is usually termed as servitization [17]. Despite servitization it is, by no means, a new topic, it is undoubtedly the object of a renewed interest in literature [2], [14], [6]. In spite of all the discussion about the importance of servitization, however, there is little empirical evidence about the impact of servitization on firm's pricing practices [11]. This paper fills in, at least partially, this gap, presenting a theoretical framework to explain how manufacturing companies determine the prices of their offerings of product service systems (PSS). In order to do so, we have surveyed the scientific literature on pricing practices of product services, using such key-words as pricing, product-service, servitization, bundling, full service, service contract, PSS. We have retrieved some interesting contributions on this subject, and we have developed a conceptual model to represent all the factors that could influence pricing decisions. Then, we have used case study research to get a descriptive picture of real-world pricing practices. Finally, linking the context-specific factors to the pricing strategies, we have developed a framework that can be helpful in pointing out the managerial implications of the pricing mechanisms used by firms. Therefore, the paper is organized as follows: in the next section, we discuss the theoretical issues of pricing, in section 3 and 4 we introduce the conceptual model and present the case studies, in section 5 we point out the relevant findings and the managerial implications from our framework.

2 The pricing dilemma

Undoubtedly, price is the most powerful and flexible lever of the marketing mix. Any pricing decision directly affects the customer purchasing intention, and influences the revenues and the profitability of business. Despite its importance, scholars have shown little interest in pricing theory and practices [13], [21] and less than 2% of all articles published in major marketing journals refers to this subject [12]. Furthermore, most of the theoretical perspectives and normative models suggested by academic people are simplistic, and assume the conditions of perfect information to determine the price value that optimize some company's overall objectives [5]. This scarcely complies with real world practices [4], where pricing decisions suffer from a big deal of uncertainty over several phenomena (e.g. how price variation influences the customer's demand, how competitors' response to price variation, etc.). As a result, the pricing mechanisms are rarely designed to be consistent to the company's strategy [16]. Three major practices for pricing decisions are discussed in the marketing literature: cost-based pricing, competition-based pricing and customer-based pricing. Due to its easiness, cost-based pricing is the dominant practice, as reported by several authors [3]. In cost-based pricing, the company sets up the price of a product/service as the sum of the costs plus a profit margin. In competition-based pricing, the price is adjusted to meet market situations as well as the competitors' behaviour. Although both these practices are extensively

used in the service industries [21], they are deemed as not effective as the service business becomes more and more dynamic and complex [7]; indeed, these practices provide little guidance on how much higher or lower than the competitors a service provider should set its price in order to achieve the company's objectives. Conversely, in customer-based pricing strategies, prices are determined to be commensurate with the value delivered to the customers. The value is estimated in terms of missed cost and/or incremental revenues for the customer, due to the service provision. However, value as it is perceived by the customer can differ from such an estimate, being much more related to the trade-off among what is given (i.e. monetary and non-monetary price, such as time, efforts and sacrifice) and what is received (i.e. different types of benefits, such as financial, relational, psychological and learning benefits [8]). Marketing people refers to this trade-off as the overall utility of the service. To assess the overall utility of a service is a cumbersome task, magnified by the intangible nature of the service itself. As explored by Yadav and Berry [20], some pricing strategies (e.g. flat-rate, full-service/all-inclusive contracts, warranty extensions, pay-per-use formula, benefits-driven pricing, etc.) can be adopted to reduce this uncertainty and to directly communicate, to a certain extent, the value proposition to customers.

Dealing with PSS, pricing decisions must be taken considering the option of selling bundles of product and product-services. In a pure bundling strategy, product services cannot be purchased separately from the product. In a mixed bundling strategy, customers are offered the opportunity to either get the bundle (generally, with a price incentive) or its components (i.e. the product and the product services) separately. The effect of a bundling strategy on the customer's purchasing intention of a PSS is very hard to determine. Since the seminal work from Adams and Yellen [1], the literature on this subject is sparse and most of the models assume that companies act as monopolists and goods are commoditized (i.e. no premium-price can be achieved thanks to market differentiation). Herrmann et al. [9] examine the influence of bundling factors, finding the most relevant as the number and the complementary of the components in the bundle, and of the price discount. Guiltinan [7] presents a normative framework for selecting appropriate types of services for different mixed-bundling discount forms.

3 A model for inquiring pricing practices of product services

According to neoclassical economics, in perfectly competitive markets each player cannot influence the price of the goods it buys or sells, thus it acts as a "price taker". The more a player can exert some sort of market power, can achieve differentiation and/or can exploit information asymmetry, the more it gets premium prices to the detriment of the costumers' surplus, and the market "fails". Notwithstanding the price is taken, negotiated or ruled by the government, it influences the quantity of any good that will be exchanged, so firms should base their pricing decisions on the estimation of the price elasticity of demand and supply. Unfortunately, several factors can influence these phenomena. In order to investigate the context-specific factors of pricing practices, we have developed a conceptual model, distinguishing: a) business

factors, such as the ones related to strategy, organization and competences of a company; b) productive factors, such as the ones related to the performance of the production and delivery process (e.g. time, costs, etc.); c) market factors, such as the ones related to competitive pressures, barriers and price wars; d) institutional factors, such as the ones related to national and international laws and regulations and e) relational factors, coming from the relationships that exist among the product manufacturer and its customers. Examples of these factors are the market qualifiers of the offerings (e.g. in terms of price, innovation, quality, etc.), the market power and information asymmetry, the contractual agreements, the negotiation skills of customers and third-part suppliers (such as spare-parts and logistics service providers), the dimension of the installed base, the portfolio of product services, the competitive strategies and financial objectives of the manufacturing company (e.g. achieve profits, get market penetration, increase revenues and/or market share, etc.). The fundamental view of this line of reasoning (see Fig. 1) is that the price of any product service either sold as a bundle or not, is determined according to a pricing strategy that, in its turn, determines the practice to be used: methods, processes, tools, data and organizational forms. Understanding how and why such practices are deployed is the scope of our research.

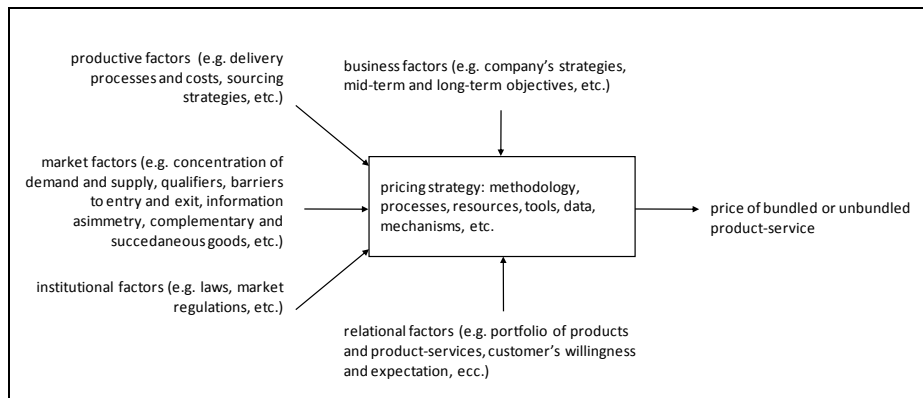


Fig. 1. A conceptual model of the contextual factors driving the deployment of a pricing strategy.

4 The case studies

The companies selected as case studies belong to different B2B industries. Notwithstanding, they all supply complex products, that provide mission-critical results within the customer's process. As a result, product services are aimed to exploit, at a maximum level, the product performance. In this case, the price to be paid may be worthwhile. The description of the cases is summarized as follows (names have been withheld for confidentiality reasons).

Case 1 - Digital Systems Company (DSC):

DSC is a worldwide leading supplier of digital solutions for imaging and printing, with consumer electronics products such as cameras and high-quality printers, and professional products, such as multifunctional devices (MFDs), copiers, scanners and plotters. The first ones are commercialized through a network of traditional dealers and virtual resellers, whereas the latter through a network of independent business partners. As for our purposes, just the activities related to the servicing of professional products in Italian market have been taken into consideration. The strategy of this business has been significantly changing. In the recent past, the focus was on the sale of spare parts, consumables and warranty extensions through the network of official concessionary agents and retailers. Leasing services, all-inclusive pay-per-page renting, consultancy and business process outsourcing services for document-management, have been introduced in the last years.

Case 2 - Power Systems Company (PSC):

PSC is a leading manufacturer of oil & gas industrial machineries, such as centrifugal compressors, gas and steam turbines. PSC supplies products and services in any single phase of petrochemical processes, from extraction up to refining, for onshore, offshore and subsea applications. Notwithstanding PSC is a manufacturing company, during the last years the service unit, which is responsible for the sales of product services, has become the most profitable division and revenues from the sales of services have steadily increased.

Case 3 - Signaling Systems Company (SSC):

SSC is a leading supplier of railway and mass transit transportation systems. Notwithstanding SCS acts as a world-wide lead contractor for turnkey projects, as for the present purposes only the business unit supplying railway signaling systems (such as traffic management, planning, train control and signaling) has been taken into consideration. This unit operates either independently, by offering its solutions (products and services) directly to the market, or in conjunction with the supplying of an integrated transportation system.

Case 4 - Railway Vehicles Company (RVC):

RVC supplies vehicles for railway industry. Main activities carried on by RVC concern the design and manufacturing of the mechanical parts, of the traction and auxiliary electrical equipments of the vehicle as well as the provision of maintenance and technical services connected to the vehicles.

Table 1. Overview of the case studies (figures are averaged on financial years 2004-2008).

<i>Company</i>	<i>Products</i>	<i>Total revenues</i>	<i>From service sale</i>
DSC	Printing machines	143 M€	5 %
PSC	Gas turbines, oil & gas industries	2499 M€	35,3 %
SSC	Signaling systems for railways transportation	355 M€	5,4 %
RVC	Railways vehicles	459 M€	3,3 %
GCC	Compressors - oil & gas, food industry	98,6 M€	15 %

Case 5 - Gas Compressors Company (GCC):

GCC designs and produces compressors for technical gases and air separation plants. GCC has a business unit dedicated to the sales of maintenance services over its

installed base, which is supported by a network of agents and service centres spread all over the world.

Table 1 summarizes the most significant figures of the case studies. Apart from DSC, data refer to the activities carried out at a world-wide level. Conversely, data for DSC refer solely to the activities carried on by the Italian subsidiary.

5 Findings

We can summarize the most important findings from the case studies as follows.

- a) cost-based pricing practices are commonly used for determining the price of product services (according to traditional “mark-up plus” approaches), and for controlling that service delivery costs are fully covered;
- b) business objectives, such as to achieve profits or to increase the market penetration, are considered in order to adjust the price of product services time after time;
- c) pricing processes strongly differ in terms of organizational forms, lead time and dedicated resources; in most cases, standard prices are predetermined so that the requests for quotation of basic product services (e.g. fix & repair) can be satisfied in a few days; in other cases, the pricing process of complex and personalized solutions lasts for months, and requires several expertise and technical assessments; rather than focusing on market prices, in the latter case the company tries to make a price which is, to a certain extent, commensurate to the value delivered by the proposed solution;
- d) in some cases, customers do participate to the definition of the service contents and negotiate prices, while in some others they make clear what they need and wait readily for an economic proposal;
- e) in case market competition is stronger, the interactions among the customers and the service provider are very sporadic and transactional in nature; in this case, the service provider develops its proposal considering the prices of the alternative market offerings;
- f) the price of a product service is higher if its provision assures that mandatory requirements (e.g. pollution control, safety issues, etc.) can be satisfied; in this case, the customer’s demand for product services seems to be much more inelastic.

To develop a framework, we can refer to the servitization of the manufacturing company to explain the choices of a given pricing practice, even in a simplistic way. Servitization is defined as the shift of an organization from selling a manufactured product to selling a product service system [14]. In spite there is ongoing debate on the measure of servitization, among several proxies the ratio between revenues from the sales of product services and the total revenues can be used. As pointed out by Rapaccini and Visintin [15], servitization is pushed by strategic, organizational, contextual and customer-related factors. In fact, the more customers perceive the solutions to their needs as complex to be managed, the more they are willing to interact with the service provider. Thus, the establishment of an enduring customer-provider relationship is favoured, through which the customer achieves a personalised

solution to its needs. In case of complex design and management issues of PSS, market fails as the enabling mechanism to get *value-in-use* through co-creation, collaboration and relational rents [19]. In this case, the price of the product service is not an important issue for customer. Conversely, in a competitive market the exchange of value (*value-in-exchange*) is based, probably, on the offerings of standardised solutions, and standardization is the side-effect of market. In this case, products and product services tend, to a certain extent, to be commoditized, and companies don't pursue the servitization of the business as a competitive factors. Besides the costs of the delivered service, in this case the pricing practice must consider the market price. In the theoretical case of perfect competition, price equals marginal production and opportunity costs, and supernormal profits cannot be obtained. As already discussed, distortions that create economic inefficiency may occur from government regulations and/or incumbent operators (e.g. a product that cannot be served by third parties due to proprietary technologies). Table 2 presents the framework that summarizes the most significant findings from our research.

Table 2. A theoretical framework for pricing PSS

Lower	Servitization level	Higher
Product services sold "as a good" - industrial commoditization	PSS strategy	Product services sold "as part of a solution"
Transactional	Nature of customer-supplier interactions	Relational
Low	Negotiation intensity, involvement in product service design phase, market power of customers	High
Low (standard offering)	Customization level of product service	High (tailored offering)
Cost-based + competition-based	Pricing practices	Cost-based + customer-based
Very short	Length of the pricing process	Very high
Only in case the price bundle is remarkably discounted	Relevance of bundling strategies as influencing the purchasing intentions	Only in case the bundle is composed as a personal solution to the customer's needs
High	Relevance of price in determining the purchasing intentions	Low
Higher, more competition, no barriers	Concentration of product service market	Lower, less competition, barriers
Rough and ready, largely available and achievable	Competences to deliver product services	Extremely qualified, difficult to create and maintain

The results from our research are relevant from both a practical and an academic view. The framework presented, in fact, on one hand represents a managerial tool that can help manufacturing companies to understand if their pricing strategy fits their servitization strategy and the context they are facing. On the other hand, it fills a literature gap and provides useful insights to support future researches in the field of the development of pricing models for PSS.

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