

A classification model for Product-Service offerings

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Abstract

Organisations have been approaching servitisation in an unstructured fashion. This is partially because there is insufficient understanding of the different types of Product-Service offerings. Therefore, a more detailed understanding of Product-Service types might advance the collective knowledge and assist organisations that are considering a servitisation strategy. Current models discuss specific aspects on the basis of few (or sometimes single) dimensions. In this paper, we develop a comprehensive model for classifying traditional and green Product-Service offerings. Our work is not purely environmentally focused; instead, it combines business and green offerings in a single model. We describe the model building process and its practical application in a case study. The model reveals the various traditional and green options available to companies and identifies how to compete between services; it allows servitisation positions to be identified such that a company may track its journey over time. Finally it fosters the introduction of innovative Product-Service Systems as promising business models to address environmental and social challenges.

1 - Introduction

The evolution of customer needs and expectations (including environmental aspects) and the erosion of product margins and intense competition have forced manufacturing companies to change their perspective toward new business models to secure additional sources of revenue

and profits (Mathieu 2001; Gebauer et al. 2005; Neely 2009). Concurrently, pressure from customers and environmentalists has forced many organisations to understand and better manage their sustainability (Mont, 2002). Extending their traditional business into the service domain and offering bundles of products and services (PS) was a natural response for many firms (Wise and Baumgartner 1999; Pawar et al. 2009). This phenomenon is called servitisation of manufacturing (Vandermerwe and Rada 1988) and represents business models that have evolved from a "pure product" orientation toward an integrated Product-Service System (PSS).

To respond to the challenges revealed by the servitisation phenomenon (Martinez et al. 2010), product-based manufacturers have significantly changed by re-designing their organisational principles, structures and processes (Gebauer and Friedli 2005; Gebauer and Fleisch 2007; Neu and Brown 2008), as well as their capabilities (Ceci and Masini 2011; Davis 2004), relationships with customers (Miller et al. 2002; Galbraith 2002) and suppliers (Evans et al. 2007; Windahl and Lakemond 2010). There are several successful case examples of companies that have begun servitisation, such as, IBM, Rolls-Royce and Rockwell Automation.

However, most companies do not deliver PSS effectively, falling into the so called "service paradox" (Gebauer et al., 2005). The "service paradox" describes situations in which companies have invested heavily in extending their service business to increase their service offerings while incurring higher costs and without any realised returns. The current corporate structures and processes in many manufacturing companies have not been designed to plan and deliver services to the market due to their lack of service culture and mind-set (Martinez et al., 2010; Neely, 2009). In these situations, common difficulties include poorly defined service portfolios in new market segments, vague service content descriptions and a dearth of

relevant processes and resources needed to support the service provision (Bullinger et al., 2003).

To overcome these gaps, creating a suitable Product-Service (PS) portfolio must first be undertaken (Cohen et al., 2006); this PS portfolio should be characterised by different levels of service sophistication [servitisation] and may include both traditional and green PS offerings. The latter represents a recent evolution in servitisation. This evolution is characterised increasing numbers of PS solutions designed explicitly to be environmental-friendly; these designs respond to the increasing societal concern over issues, such as natural resource depletion and environmental degradation. For example, Toyota offers both traditional and green-maintenance services. Toward the same end, Car2Go (a Daimler AG subsidiary) offers green car sharing services that utilise only electric cars. For this paper, the environmental and/or eco initiatives of a PS offering will be referred to as green.

Despite the importance of providing classification schemes for these heterogeneous PS, the current literature only refers to classification models to gain strategic, marketing or operational insights. Particularly, the existing classification models have been developed to discuss specific managerial aspects on the basis of few (or sometimes single) dimensions and therefore have a narrow focus. These models are discussed further in the next section.

However, providing a unified schematic representation that captures all the characteristic dimensions of both a traditional and a green PS offering and can assist in understanding the structure and nature of their portfolio is important.

Currently there is no comprehensive model that describes PS offerings in the literature. The lack of literature precedent raises three questions: i) What are the dimensions that define a PS offering? ii) How might these dimensions be described? iii) How might PS offerings be classified in a comprehensive and uniform model?

Therefore, we propose an innovative PS offering classification model that may be used in both business-to-business (B2B) and business-to-consumer (B2C) domains. While using the PS offering to direct the investigation, the model will describe the PS portfolio of a company (including both traditional and green PS solutions) to map the transformation of the PS offerings over time and compare the different players within the market. The model structure and its major dimensions are derived from literature data; in addition, a case example involving the Italian branch of an international group operating in the heavy truck industry is used to illustrate the application on this model in a real-world context.

The remainder of this paper contains a literature review that focuses on existing PS offering classifications. The methodological approach used to build a model from a theory is subsequently discussed. The following sections describe a developed conceptual classification model and its application to a company. Our conclusions, research limitations and further developments are presented in the last section.

2 - Literature Review

This section presents the rationale behind PS business models first, followed by the four dominant elements of PS business models found in the literature. We will end this section by reviewing the dimensions of the PS offerings we found.

Rationale of PS business models

A product service system (PSS) is “a system of products, services, supporting networks and infrastructures that are designed to be competitive, satisfy customer needs and have a lower environmental impact than traditional business models” (Mont, 2002, p.239). This definition characterises a PSS as a comprehensive business model able to fulfil user requirements by providing increasingly dematerialised systems (Goedkoop et al. 1999; Manzini et al. 2001;

Roy 2000). The literature asserts that implementing PSS solutions may trigger changes in both production and consumption patterns (Briceno and Stagl, 2006) that benefit manufacturing and service companies, as well as government, society, and customers. In particular, Mont (2002), Manzini and Vezzoli (2003), Aurich et al. (2006), Baines et al., (2007), and Velamuri et al. (2011) state that if a company adopts a PS business model, it can do the following: i) provide higher quality offerings that are more customised to customers, offering differentiation to create retention and loyalty; ii) reduce both resource consumption and the environmental impact of a product during its life cycle; iii) improve corporate benefits; and iv) help create new jobs.

The four dominant elements of PS business models

Although PS business models have varying descriptions in the literature (e.g., Mont, 2004; Tukker and Tischner, 2006), several authors agree (Kindström 2010; Meier et al. 2010; Schuh et al. 2008; Gaiardelli and Resta 2010) that a PS business model encompasses four main elements:

1. The value proposition is also referred to as PS offering and concerns the bundle of products and services offered, representing the benefit for which the customer is willing to pay.
2. The infrastructure and network, such as the internal and external organisational structures, resources and capabilities, determine how products and services can be produced and delivered to customers.
3. The relationship capital that exists between the parties allows companies to target customers and distribution channels and determine how their products and services

will be delivered; building strong relationships with the customers is also a major focus.

4. The sustainable aspects of the PSS are related to the three pillars of sustainability: economy, society and environment.

This paper focuses on the first element ("value proposition", which is also called a PS offering) and the dimensions used to characterise and describe it.

Dimensions of PS offerings

In the literature, many different dimensions have been proposed to describe the various services offered by manufacturing companies. For instance, Mathieu (2001) identifies two different forms of PS offerings that differ based on their recipients (PS offering focus). These services include i) services supporting the product and ii) services supporting the actions of the customer. The services supporting the product usually employ standardised solutions and a low intensity relationship between the parties involved. The services supporting the actions of the customer refer to highly customised solutions that require significant involvement and commitment by both the customers and the providers. In this case, people are the predominant variables in the expanded marketing mixture [i.e., price, product, promotion, and place]. Both Mathieu (2001) and Kapletia and Probert (2010) provide a service classification based on the focus of a PS offering. Manzini and Vezzoli (2003) propose three dimensions based on product ownership, use and decision-making power. These dimensions define three types of PS offerings: i) services that add value to product life cycle, ii) services that provide a final result to customer, and iii) services that enable platforms for customers. These dimensions have been used by other authors.

The same dimensions are reported in Tukker's work (2004), where eight archetypal PS models are introduced and categorised into three major types (product-, use- and result-oriented services). Similarly, the ownership and use aspects, in combination with involvement in the process of a customer, are also considered by Bartolomeo et al. (2003). These researchers cluster PS offerings into two main areas: product-based services (including product-result, pooling, utility and extension services) and information-based services (including advice and consultancy, information and intermediation activities). Furthermore Gao et al. (2011) frame PS offerings using three main groups along the product ownership and product use dimensions: product-, application- and utility-oriented PSS. This categorisation is further developed by Fan and Zhang (2010) when they introduce a new dimension (ideas from Wise & Baugartner, 1999) related to the vertical integration of the Supply Chain and the level of control over the distribution systems. The ownership dimension is also proposed by Markeset and Kumar (2005), Aurich et al. (2010) and Windahl and Lakemond (2010). The latter authors also introduce the "PS offering type" in their classification regarding product vs. process focus.

Oliva and Kallenberg (2003) took an alternative approach, categorising the ways in which firms may position themselves during the transition from selling products to selling services. Toward this purpose, they categorise the PS offering using two orthogonal dimensions. The first dimension distinguishes the PS offering in product-oriented services from the user's processes-oriented services. The second dimension, according to Frambach et al. (1997), classifies PS offerings according to the nature of the customer interactions, ranging from selling products (transaction-based) to establishing and maintaining a closer relationship with the customer (relationship-based). This dimension is also reported in the work of Penttinen and Palmer (2007) while characterising the four major types of PS offerings based on the

nature of the buyer-seller relationship and the completeness of the portfolio (bundled vs. unbundled services).

Table 1 summarises the major dimensions of PS offerings considered and grouped in literature.

<INSERT TABLE 1>

We have examined the business aspects of PS offerings, but this is not the only perspective.

The green angle has been described by several authors (i.e., Manzini and Vezzoli, 2003; Tukker, 2004) as an intrinsic feature of PS offerings. In particular, scholars have analysed the potential contribution of a specific PS solution for reducing environmental impacts. For example, Tukker and Tischner (2006) argue that the environmental sustainability of product-services might be stronger on 'user-oriented services' and 'result-oriented services' than on 'product-oriented services'. Mont (2002), as well as Glavič and Lukman (2007), add that fulfilling the needs of customers through increasingly dematerialised services is often associated with changes to the ownership structures.

However, a clear representation that maps green PS offerings appears to be missing. Green PS offerings are a novel evolution that has developed in the eco-innovation research stream to fulfil customer demands over time without negatively impacting on the natural environment (Laperche and Picard, 2013, Wolfson et al., 2011), while new and more sustainable values for customers are generated. Based both on the rational use of natural resources and on acting with environmental awareness, these services have recently been used as an environmental weapon to differentiate products and services (Albino et al., 2009; Goodman, 2000; Kassinis and Soteriou, 2003).

This literature review demonstrates that there various approaches. However, in the literature reviewed above, the authors have focused on simpler representations that include few (or

sometimes single) dimensions in their definition and characterisation of PS offerings. We believe that a broader framework to support companies in describing their PS offering remains absent, and our research, as presented below, supports this belief. Therefore, we propose a descriptive classification model for PS offerings that captures and combines the relevant dimensions found in literature with a complementary and unified perspective to capture both traditional and green PS solutions. This proposed classification defines and characterises PS offerings using three different, complementary dimensions. The position of a PS offering in the diagram provides a more comprehensive description of the PS offering using the following dimensions: 1) the relationship and interaction between the customer and the provider, 2) the orientation of the offering, and finally 3) the focus on the product – process of the offering.

3 - Research methods

This research was conducted in four stages. First, we conducted the literature review. Second, we used secondary sources (i.e., companies' websites, brochures and documentation) to help develop our thinking. Third, we used constructive research with experts to develop the model, and finally, we tested our refined structure by applying it in case study. We will describe these stages in detail in this section.

A structured analysis of the literature was performed in two parts. First, research strings were created after consulting our expert panel- key academic and industrialists in the field: product-service systems, service operations, servitisation, and others. The two largest search engines in the business and management fields (Scopus and Proquest (ABI Pro)) were used to identify papers. Subsequently, to select the most relevant papers for this study, an acceptance-rejection research criterion was developed. Second, to confirm that we obtained

all of the relevant literature for this study, we applied "the snowballing" technique (Trochim and Donnelly, 2008) on the selected literature. A few recommended papers from academic leaders in the field were added to our selected literature. The literature review has remained a continuous activity throughout this research to maintain its relevance.

Drawing on our selected literature, we identified different discriminatory dimensions and PS types of servitisation. By selecting only the frequently cited dimensions, we grouped and analysed these dimensions to create an initial conceptual model that could explain the different attributes of a PS offering.

After creating this initial model, we used it as a template to analyse current PS offerings in the manufacturing industry. The study explored, but was not limited to, considering manufacturing companies operating in the main European industrial sectors and conducted based on publicly available information collected from company websites and their brochures. In this analysis, we examined both the business and green aspects of PS offerings. After creating and verifying the initial model, we presented it to 20 academic experts during several workshops and conferences before applying it in 5 companies through in-depth interviews at the senior management level (3 per company, 15 interviewees). For each company, we interviewed the Service Director, the Business Development Manager and the Operations Manager. Each of the 15 interviews was carried out by two or three researchers, lasted between one and two hours, was recorded and was subsequently transcribed. The feedback from both scholars and practitioners was used to construct the final version of the model that we validated further.

The revisited model was applied to a sixth company in the heavy-truck sector; the results are presented later in this paper to illustrate how the model may be used by practitioners. The

company was chosen for its strategic characteristics. As argued by Porter (2008), the heavy-truck industry is structurally challenging because there is rampant price competition and little product differentiation due to regulatory standards. Moreover, traditional sources of profit, specifically vehicle sales continue to decline, while customer expectations are transforming: customers desire transportation solutions, including those with low environmental impact, instead of a vehicle. Therefore, truck manufacturers must establish a provision of value around customer solutions and move from transactional to relational models while addressing larger transportation challenges (Rishi et al. 2009).

In the final stage of this research, we mapped the PS offerings of this last company onto the proposed classification model, to understand the landscape of products, services and their intersection. For each of the PS offering types, an analysis was performed to understand and explain the individual meaning of each offering (illustrated in Table 11), its nature and its financial consequences for the company growth, as illustrated in Figures 4 and 5. After the analysis, the findings were presented back to the interviewees to ensure we had correctly represented the research analysis. We will present our findings in the next sections.

4 - A classification model for Product-Service offerings

The model was built using the methodology described above. The first part of this section presents the model, while the second focuses on illustrating the model with real company data using secondary sources (i.e., websites, brochures and company documentation such as marketing and sales reports, strategic performance metrics and others).

4.1 - Model development

The proposed PS offering classification model has been created using three major dimensions, as discussed in section 2. The first is called the PS offering orientation and refers to the categorisation suggested by Tukker (2004), who grouped the PS offerings in three main types: product-, use- and result-oriented services. The characteristics of these types are explained in terms of ownership, use and decision-making power (see Table 2).

<INSERT TABLE 2>

The second dimension refers to the focus of the PS offering. At one end of this dimension, the company ensures the availability and functionality of the product by supporting the processes and activities of the end-users (Kapletia and Probert 2010; Mathieu 2001; Oliva and Kallenberg 2003; Windahl and Lakemond 2010). According to Mathieu (2001), intensity of the relationship (the involvement and commitment of both the customer and the PS provider) and service customisation increase, the focus changes from the product to the process. The types and characteristics of the focus of the PS offering are shown in Table 3.

<INSERT TABLE 3>

The third dimension frames the PS offering according to the nature of the interaction between the customer and the PS provider (Frambach et al. 1997; Oliva and Kallenberg 2003; Penttinen and Palmer 2007). For this dimension, the interaction changes from a transaction-based to a relationship-based perspective. By taking over the responsibility for activities previously performed by the customer, the risk level that the PS provider assumes increases. The need to incorporate the risk into the offering price (Sawhney, 2006) involves setting a price on the value created for the customer (Gebauer and Friedli, 2005). Service pricing schemes also change from traditional "transaction based" (mark-up and fixed-fee) to

innovative "relational based" model revenues (Bonnemeier et al., 2010). The latter relate pricing measures to usage (such as time and intensity), performance (such as availability and quality) and results (such as turnover and cost savings), as shown in Table 4.

<INSERT TABLE 4>

The three dimensions and their corresponding types can be summarised in the general structure of the PS offering classification model depicted in Figure 1.

<INSERT FIGURE 1>

In the next few paragraphs, we briefly describe the model that is structured around the first dimension we described above. The three dimensions that characterise the PS offering orientation are as follows: product-, use- and result-oriented. The offerings included in each paragraph are subsequently described using the other two dimensions.

4.1.1 - Product-oriented services

According to Tukker (2004), two different forms of service exist: product-related service and advice, training and consulting services. The main difference between the two forms of service refers to the PS offering focus. Product-related services focus on products, while advice, training and consulting are focused on both products and processes.

The first form of service includes embedded services that are provided by the supplier to help the customer manage a product during its useful lifetime, specifically maintenance contracts, supplying spare parts and consumables, product inspection, diagnosis/repair, transportation,

on-site installation, refurbishing, cleaning, updates, upgrades and a return agreement for the end of the product lifetime.

The product-related service form is categorised into three different sub-forms, in accordance with the nature of the interaction between the customer and the PS provider:

- Pure transactional services are provided for customer-specific requirements, such as product transportation, installation, returns, on- and off-site repairs, spare parts and the delivery of consumables. The customer pays for these services every time they are used.
- Extended warranties and preventive maintenance services include the product repair and maintenance that are provided at the PS provider's expense. Generally, there is a single payment covering a pre-defined period, as indicated in the contract.
- Condition-based maintenance is based on prognostic technology; these service solutions require very strong involvement by the service provider while obtaining and monitoring product data and information. Consequently, these PS are often combined with pay-per-result formulae implying that the customer pays the PS provider only if the service performances are in line with a pre-defined Service Level Agreement (SLA).

Relative to the product sold as the second form of service, the PS provider may also give advice, training and consulting services for the product regarding its most efficient use (including the most energy-efficient configuration) and the life activities, processes and business of the customer. For example, these activities can include knowledge-based services, such as documentation, help desk or hot line services, training for product use, advice regarding product choice, training and consulting for developing teams and organisations, or for improving the skills and competencies needed to manage processes and business. In addition, the PS provider can offer competencies and skills to the customer and jointly

develop a single product, a specific process or a business, instead of directly managing an internal function or business units.

Similar to the product-related services, advice, training and consulting services can also be classified according to the nature of interaction between the customer and the PS provider. In particular, providing documentation is a purely transaction-based service because it requires interaction only when the documentation is provided. However, help desk, hot line and training activities require a closer relationship between the customer and the PS provider; the interactions occur in more situations, such as during each training session, as well as every email or phone call. The trainer/customer service employees must know the customer's products and processes to provide good service support. A greater involvement in the customer processes and a deeper knowledge concerning the business is required when consulting services are provided.

In conclusion, the interaction level depends on the type of advice, training and consulting provided. In particular, the customer interaction shifts from transaction-based to relationship-based, ranging from pure advice to consultancy or providing an internal function or business unit management. The different characteristics of product-oriented services are summarised in Table 5.

<INSERT TABLE 5>

4.1.2 - Use-oriented services

In this type of service offering, product leasing, renting, sharing and pooling are included. For leases, the lessee pays a regular fee for unlimited and sole use of the product. With a renting service, the customer has sole use of the product for a limited period, while in sharing

solutions, the product is used sequentially by different customers. Finally, the product pooling approach suggests the simultaneous use of a product by different customers. Both sharing and product pooling have implications for reducing the environmental impact of the creation and use of these products. All of these PS offerings can be proposed using different configurations, ranging from short- to long-term contracts. For short-term agreements, the interaction is generally transaction-based, while long-term contracts are characterised by a closer, more stable relationship. Table 6 reports the main features of these PS offerings.

<INSERT TABLE 6>

4.1.3 - Result-oriented services

This type of service occurs in three different forms (Tukker, 2004): pay-per-use, outsourcing and functional-result services. For pay-per-use services, the user buys only a product's level of use. However the responsibility and the decision-making regarding the product use remains with the customer (i.e., the customer uses the product and decides when and how to manage it). During outsourcing, the PS provider manages one or more activities on behalf of the customer, but the decision on how to perform and control these activities remains the responsibility of the customer. Finally, when functional-result services are provided, the supplier is completely free to decide how to deliver the result and is concurrently the product owner, the user and the process decision maker. Given their nature, these PS offerings are based on relationship-based interactions, as illustrated in Table 7.

<INSERT TABLE 7>

4.2 - Populating the model

As described in the methodology section, the model was empirically populated using secondary data. We have included both traditional and green PS offerings. The PS offerings have been coded using a number and a circle, while the green PS offerings have been coded using a number with a special additional code ("g") and a square. Tables 8, 9 and 10 provide various PS offering examples sorted by type. To ensure the readability of Figure 2, only PS offerings are reported.

<INSERT TABLE 8>

<INSERT TABLE 9>

<INSERT TABLE 10>

We tested the validity of the model by presenting it to academic and industrial experts during several workshops and conferences. The major feedback related to the applicability of the model to integrated packages, comprising a set of services that companies might introduce to meet customer needs in the long term. For example, Scania (the truck manufacturer), offers different types of fleet management service packages that may be coupled with training courses for the driver and personalised maintenance programs. Vitsoe (a German producer of shelving systems), offers that includes planning, installing, dismantling, re-installing, repairing and refurbishing their products.

To respond to this feedback, a dotted line linking the services that make up the integrated package might be used as depicted in Figure 2.

<INSERT FIGURE 2>

5 - An empirical application

In this section, we describe and apply the proposed PS offering classification model to a company. This company is one of the major players in global transport and will be referred to as Alpha. Alpha is the Italian subsidiary of an international group leader in the development, manufacture, marketing and servicing of numerous medium, heavy and specialised vehicles. The group aims to become the world leader in sustainable transport solutions by meeting the continuously increasing needs for transportation, while generating value for the customers and minimising the environmental impact of its products and activities. This approach encompasses the entire business, from the development of new trucks and services, to the continuous improvements in the operations and a close cooperation with other key players. Alpha's customers are categorised into three different families:

- Single customers represent approximately 70% of the total market for Alpha and are simultaneously the owners and drivers of the truck. Customers in this category are primarily focused on the product and its utilisation. Therefore, they are mainly interested in receiving services that support high levels of truck availability over time, such as maintenance and repair.
- Logistical transport enterprises are generally medium or large companies that manage a fleet of vehicles and trucks. The main factor driving these customers to choose a product is the total lifetime cost of the product (total cost of ownership).
- The owners of old vehicles (second hand) are generally single customers and primarily focussed on buying cheaper products in conjunction with the overall product life-cycle. Consequently, customers belonging to this "niche" category consider the service offering because they think value is synonymous with low price.

The Alpha PS offerings are described in Table 11 (the first column refers to the numbering already adopted in Tables 8, 9 and 10) and mapped in Figure 3. It comprises various products

and services provided by the company either directly or through a technical assistance network of authorised dealers and workshops. Alpha does not provide an integrated package of services. To differentiate traditional and green PS offerings, different shapes (circles vs. squares) and colours (black vs. green) may be used.

<INSERT TABLE 11>

<INSERT FIGURE 3>

Providing refurbished spare parts [PS offering type # 3g] is the only service that Alpha offers that directly contributes to the sustainability of the group. Moreover, Alpha provides several services that improve the green awareness of its customers, such as fleet management solutions [PS offering type # 15] and training courses [PS offering type # 18].

5.1 - Financial implications of the PS offerings

Since 2000, there has been a rollercoaster effect, according to Carnall (1995), for Alpha in the Italian heavy truck market. In 2001, Alpha accounted for approximately 3000 unit sales. From 2002 to 2003, a mini crisis drove the first reduction in sales (approximately 16%). In response to this crisis, the Italian government introduced incentives to encourage the sale of units/trucks and enhance compliance with the Euro3 (engines) regulations. Sales increased by 30.5% between 2003 and 2008. Between 2008 and 2009, the market dropped 61% due to the global financial crisis. This new level of sales (approximately 60% less than 2001) had been maintained until the end of 2010.

Despite the sales crisis that Alpha and the Italian market have experienced, the service business has remained more stable. The level of service revenues have been characterised by

constant increases from 2001 to 2008. Between 2008 and 2009 the Alpha service market shrank by 8.5% (compared to the 61% losses of total products sales).

The revenue generated by Alpha's PS offerings in 2006 and 2010 are mapped in Figures 4 and 5. The size of each bubble is proportional to the percentage of the total revenues generated. The continuous line refers to Alpha service revenues, while the dotted line refers to its assistance network.

<INSERT FIGURE 4>

<INSERT FIGURE 5>

The Alpha PS offerings include approximately 27% of the total services identified in Figure 2. All of the PS offerings belong to the product-oriented service area (Figure 3). The company has focused its attention on providing services that ensure the product is available and functional while helping customers manage their vehicles through advice, training and consulting. This position is in response to the market structure that is dominated by single customers who are both the owners and drivers of the truck. These choices of these customers are based on technical and tangible aspects of the services that are selected and purchased to enhance the performance of the product over time. As displayed in Figures 4 and 5 using the size of the bubbles, Alpha receives the majority of its service revenues from selling spare parts [PS offering type # 3 and 3g], accounting for 80.3% and 79.7% in 2006 and 2010, respectively. In particular, the sales of new spare parts increased by 3.3%, while the sales of the refurbished spare parts decreased by 3.9%.

The main source of revenue for the technical assistance network arise from repair and maintenance services [PS offering type # 9a and 9b] that contributed to the network revenues by 79.3% (2006) and 76.4% (2010), respectively.

Two important considerations may be highlighted analysing the data for the repair and maintenance services [PS offering type # 9a and 9b]. First, repair and maintenance services without a contract [PS offering type # 9a] are not a direct source of revenue for the company. However, Alpha considers this type of service to be a crucial element that boosts its spare parts sales. The higher the number of maintenance and repair services provided by the network, the higher the company's revenues from the sales of its own new [PS offering type # 3] and refurbished [PS offering type # 3g] parts. The data also reveals another significant trend: repair and maintenance revenues during the warranty periods [PS offering type # 9b] decreased by 5.2% for Alpha and by 6.0% for the assistance network. This noteworthy reduction is caused by an increase in the product quality and reliability, and both factors are important for Alpha's reputation. The company has gradually built its brand image by providing high quality, technologically innovative and reliable products alongside a complete service offering.

Even though 4 out of 10 of the offered services refer to advice, training and consulting activities, they account for only a small portion of the total Alpha revenue and are growing very slowly (from 0.5% in 2006 to 0.9% in 2010). However, the Alpha managers believe that these services may play a key role in supporting the process of delivering the PS offering. For instance, some of these services are offered free of charge [PS offering type # 13 and 14]. In general, revenues from this service category are expected to increase significantly over the next few years, due to a growing customer interest in having innovative solutions to enhance their operations and improve their business performance.

Finally, the change in revenue streams over the last five years reveals that the company enlarged its service portfolio by developing transaction-based solutions and suggests that Alpha is also committed to discovering new alternatives that support its customers' processes and businesses. This commitment is demonstrated by the recent introduction of legal assistance [PS offering type # 21], which is a new consulting service aimed at supporting customers after a road accident. Moreover, as shown by the evolution of the PS offerings and its revenues over time, the company is moving toward creating and consolidating relationship-based services to "lock-in" customers. Services, such as maintenance contracts [PS offering type # 11], have become more popular over the past 5 years to reach 5.4% of the total company service revenues and 3.3% of the total assistance network revenues. This significant change in the revenue stream underlines the on-going cultural transformation of Alpha's customers, who appear to be more interested in having solutions that reduce the total cost of truck ownership.

In conclusion, we believe that, after looking at Alpha's PS offering, this company remains highly product-focused and continues to emphasise the tangible elements of its PS offering. However, despite the company's approach toward developing its service offerings with a product-oriented perspective, a transformation has already begun toward relationship-based and process-based PS offerings, allowing Alpha to benefit from the positive effects of servitisation, such as higher and more stable profits, as well as greater customer loyalty and retention, as already underlined in literature by various authors (i.e., Brax, 2005; Correa et al., 2007; Malleret, 2006).

5.2 – Green implications of the PS offering and discussion

Despite the great importance assigned to green aspects, the number of services explicitly addressing this topic remains low. This choice is most likely because Alpha's customers lack concern about green issues. In fact, the percentage of the revenues coming from spare parts is much higher for brand new parts [PS offering type # 3] than refurbished parts [PS offering type # 3g] in both 2006 and 2010 for Alpha and its assistance network. However, introducing process-based services that, according to Tukker (2004), have an intrinsic potential in reducing the environmental burden indicates that Alpha is continuously attempting to sensitise its customers toward the importance of services regarding sustainability. Services, such as fuel-saving maintenance, upgrades, fleet management systems and driver training courses, demonstrate that important cost savings for the customers may be combined with a reduction in the environmental impact of the truck.

In conclusion, some considerations regarding Alpha's present and future development of green PS offerings have emerged. First, the growth of Alpha's green value proposition remains potentially large. The company has not finished capitalising on the green advantages derived from existing process- and relationship-based PS offerings. In addition, 'user-oriented' and 'result-oriented' PS offerings characterised by higher intrinsic environmental sustainability (Tukker and Tischner, 2006) have not yet been developed, even though different PS offerings that are already implemented in other industries might translate easily to Alpha's industry. Moreover, because solutions that combine green products and services have been developing exponentially in different sectors (as depicted in Tables 8, 9 and 10), the possibility for eco-innovations in the value proposition by providing new green PS alternatives is therefore enormous.

Applying the model to Alpha has allowed us to test the usability and utility of the model. By mapping and exploring the different service offerings, the model allows companies to

identify the landscape in which they can expand their revenue by offering services attached to their products or moving toward a service-led customer offering. This transition may lead to the development of new solutions, including those that are green.

6 - Conclusions and research limitations

The servitisation literature stresses the role of 'PS offerings' as a central element of any PS business model and servitisation strategy. Despite the importance of these offerings, there has not yet been a unified model for mapping them. The existing models are one-dimensional, and therefore do not reflect or capture the richer picture derived from theory and practice. To fill this gap, we have created a multidimensional model that identifies and illustrates the different characteristics of PS offerings, while combining the dimensions of the different models available in literature. This new model integrates information from both theoretical and practical analyses and is important for the following reasons:

- i. The wider and more comprehensive classification of PS offerings enables practitioners not only to identify where their current PS offering lie but also to understand the wider range of available options. We believe that these classifications will expand the horizons of the managers, enabling them to make better choices as they develop their PS offerings.
- ii. Because our model identifies both the position and the characteristics of the PS offering, it provides practitioners with knowledge and guidance regarding what needs to be changed to move from one position to another.
- iii. Finally, this model may highlight opportunities to exploit the environmental aspects of the PS offerings not addressed by previous models or frameworks. This model

blends business and green issues; therefore, it helps decision makers understand the choices and options available.

This new model has a structure that encapsulates both traditional and green PS offerings. The latter represents a novel innovation of PS offerings developed recently eco-innovation research evolves to fulfil customer demands while minimising the negative environmental impact over time. In this novel classification, traditional services are mapped on the model as spots or bubbles, while green solutions are squares. The size of the bubbles / squares may vary according to the value of a specific variable, such as service revenue, profit, degree of innovation or maturity.

This approach has other advantages and might be used both in B2B and B2C contexts to: i) map each individual service as a part of the entire PS offering of a company; ii) benchmark different offerings within the same industry or different markets; iii) map the servitisation journey of a company over time to demonstrate the composition and achieved values of PS offerings during different years; and iv) represent integrated packages that comprise several services, linking the respective bubbles to one another other.

Finally, we believe that this model may help managers describe and compare existing offerings, while interpreting and evaluating their differences. We believe this model will enable better design or re-design of PS business models within various companies, particularly during the creation of a portfolio of products and services; creating this portfolio is the first fundamental step toward developing a formal business model able to improve the service quality levels, as well as reduce operating costs and investments in service assets.

This understanding of PS offerings and business models is a central challenge that fosters the introduction of innovations with limited applications. This aspect may be relevant for the

sustainability debate because PSS approaches are a promising way to address environmental and social challenges.

This research has some limitations. First of all, it is focused on the relationship between PS suppliers and end customers, excluding other relationships. To make the model clear and readable, we decided to limit the maps to PS offerings that are provided by a PS supplier to the customer. Specifically, we decided to exclude the types of services that PS providers may introduce to support their stakeholder network in connection with the customer as "training services for assistance networks".

Additionally it was decided to create a mode able to capture temporal expansion of the PS offerings (Sawhney et al. 2004). This type of expansion occurs when companies provide services that were previously performed by their customers (temporal reconfiguration) or introduce new services that cover different stages of a product's lifecycle (pre-sale, sale, post-sale, dismantling), modifying the point of provision. We excluded the spatial dimension of a PS offering from our model; this parameter may when describing what a company provides when moving into an adjacent service business to corner the market.

Moreover the conceptualisation and explanation of this classification model was a theory building initiative. Further work is needed to test the model empirically, particularly to evaluate the following (Collier and Meyer, 2000): i) the clarity of the construct definitions and indicators on each axis, ii) the conceptual independence of the criteria on the horizontal and vertical axes of the matrix, and iii) the one-dimensional nature of the axes.

Furthermore, we observed while reading the Alpha case that some services are not provided directly by the company; instead they are provided by its service assistance network.

However, we have not considered this point of view in our discussion. Therefore, in-depth

case studies focusing on service networks should be undertaken to extend and enrich this approach.

Finally, this model provides a general picture of existing PS offerings, including solutions based on eco-friendly products and/or green processes. The scope of the model presented in this paper does not include the environment as a dimension; therefore, the intrinsic green potential of the PS solutions is not fully investigated. Future research is required to advance this environmental angle.

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Tables and Figures

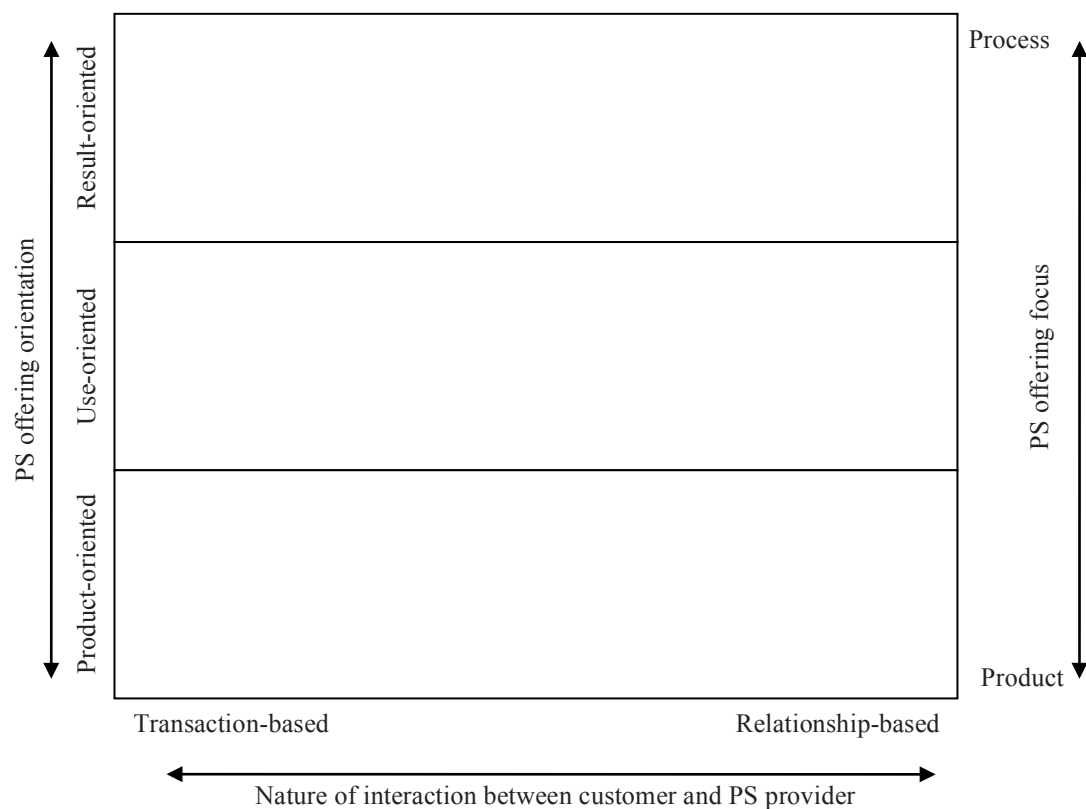


Figure 1 – The PS offering classification model: general scheme

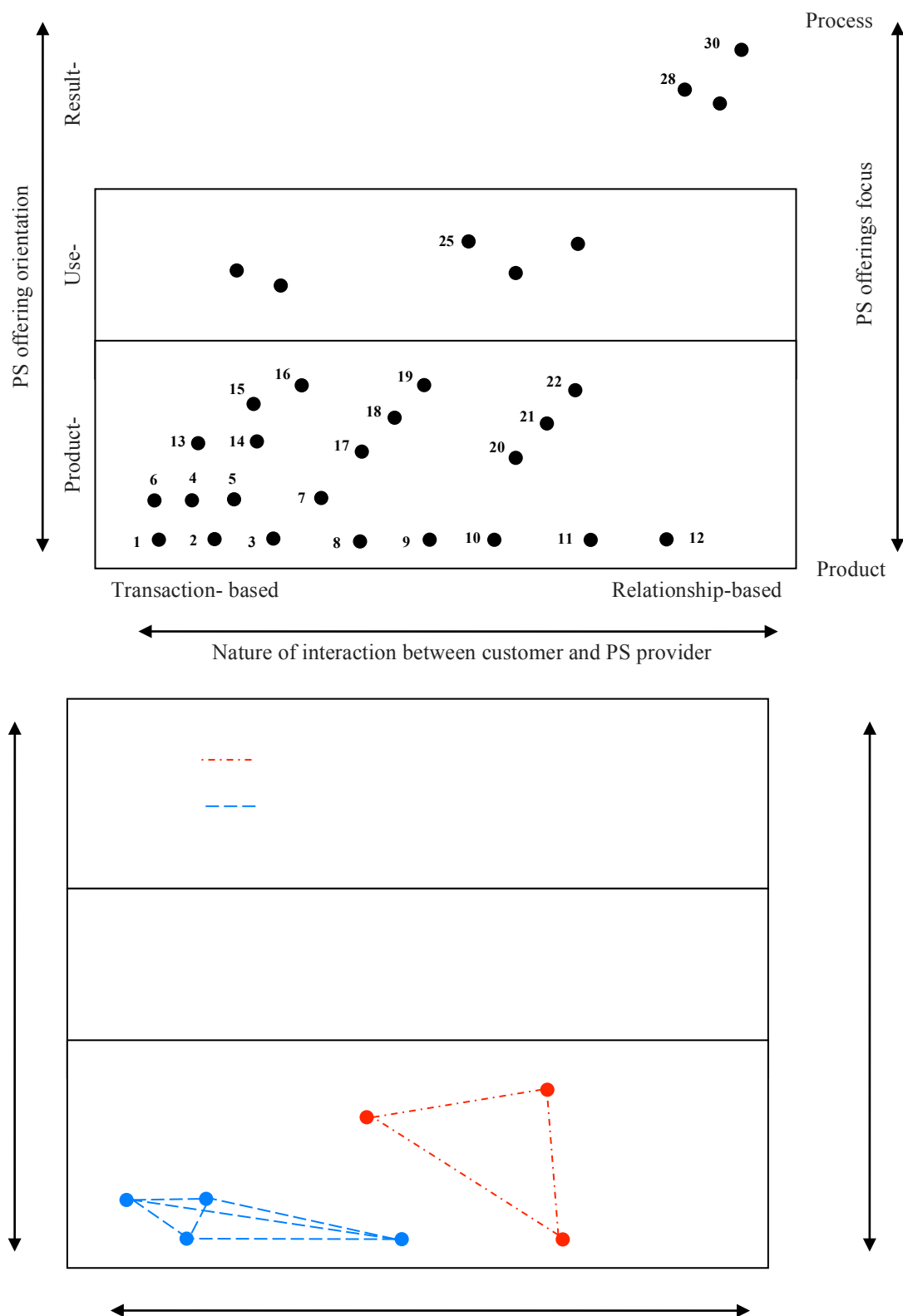


Figure 2 – The PS offering classification model: types, industrial examples (traditional PS offering) and integrated package representation

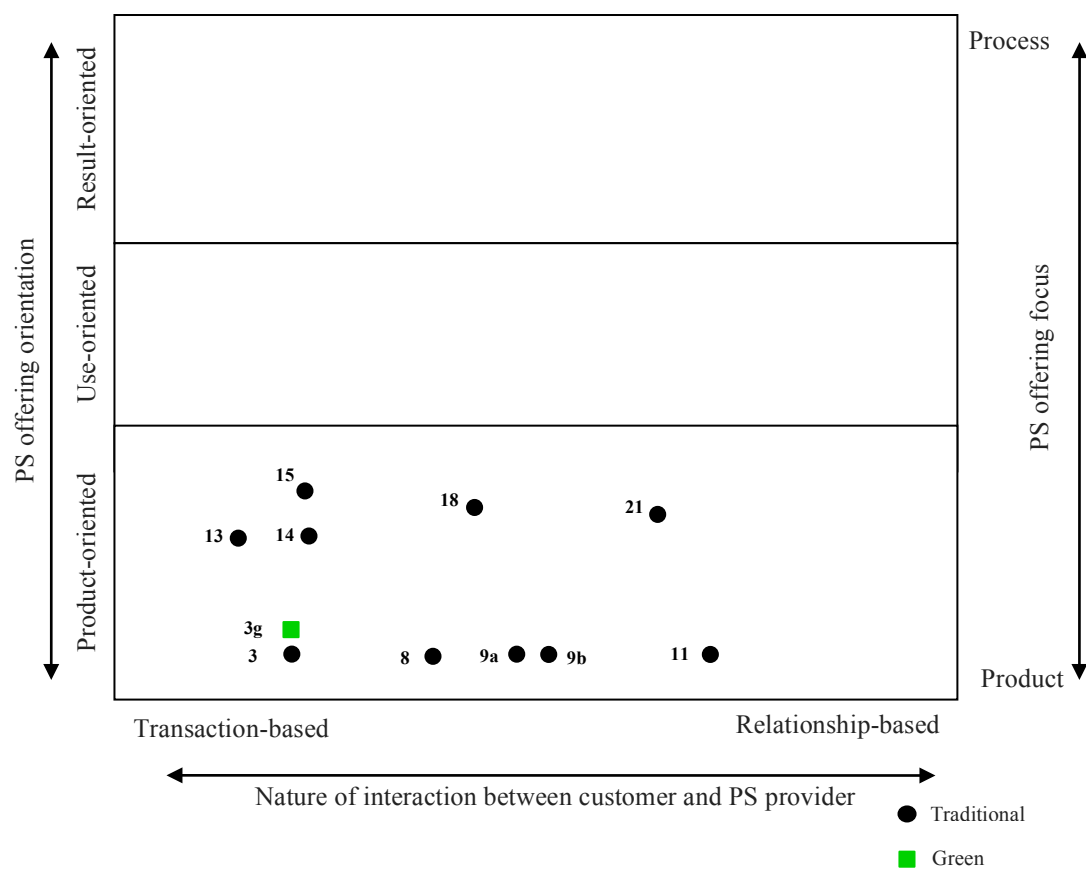
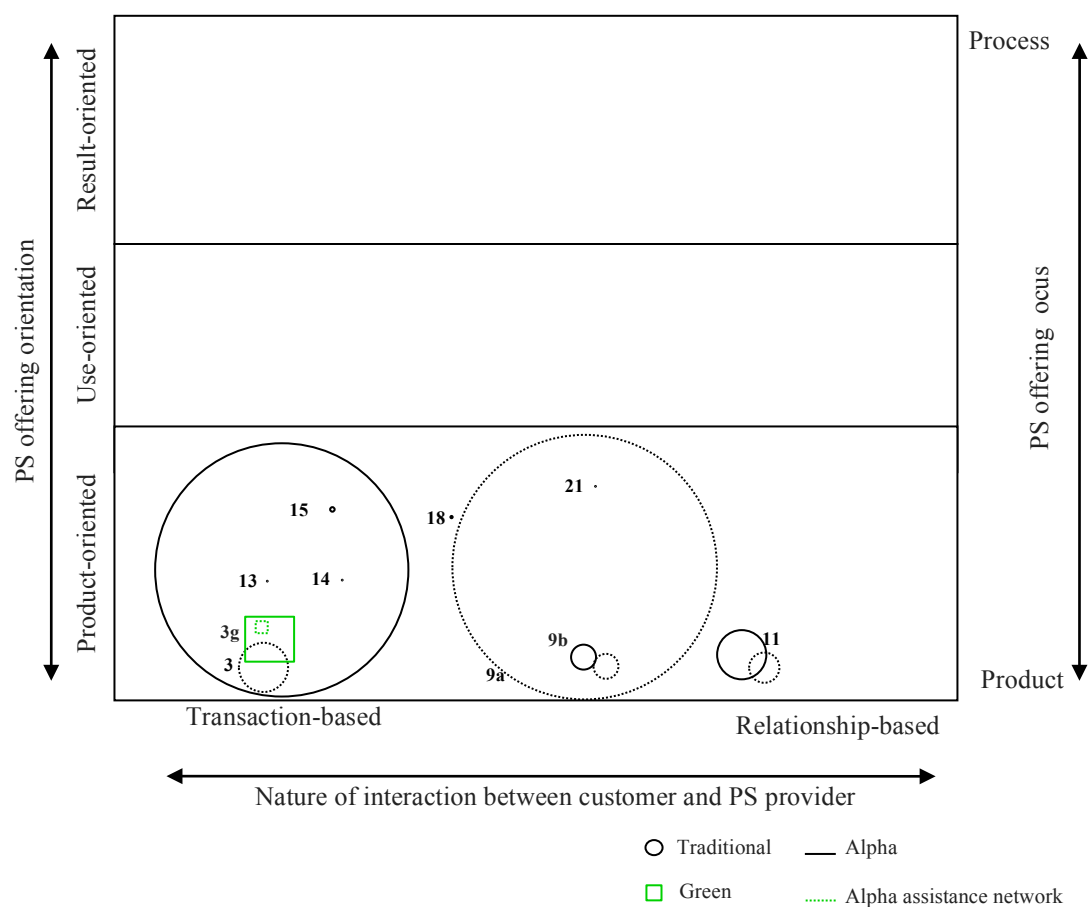


Figure 3 – Alpha's PS offerings



<i>PS offering type</i>	3	3g	9a	9b	11	13	14	15	18	21
<i>Alpha</i>	67.6%	12.1%	n.a.	6.5%	12.9%	0.0%	0.0%	0.6%	0.3%	0.0%
<i>Alpha assistance network</i>	13.1%	2.3%	69.7%	6.7%	8.1%	n.a.	n.a.	n.a.	n.a.	n.a.

Figure 5 – 2010 Alpha's PS offering revenues (as % of the total)

Table 1 – Major dimensions of PS offerings (based on literature)

References															
Dimension		<i>Aurich, Mannweiler, and Schweitzer 2010</i>	<i>Bartolomeo et al. 2003</i>	<i>Fan and Zhang, 2010</i>	<i>Frambach, Wels-Lips, and Gündlach 1997</i>	<i>Gao et al. 2011</i>	<i>Kapletia and Probert 2010</i>	<i>Markeset and Kumar 2005</i>	<i>Manzini and Vezzoli 2003</i>	<i>Mathieu 2001</i>	<i>Oliva and Kallenberg 2003</i>	<i>Penttinen and Palmer 2007</i>	<i>Tukker 2004</i>	<i>Windahl and Lakemond 2010</i>	Total
<i>Product Ownership</i>	X	X	X		X		X	X					X	X	8
<i>Product Use</i>		X	X		X				X				X		5
<i>PS offering focus</i>							X			X	X			X	4
<i>Nature of the interaction between the customer and the PS provider</i>					X						X	X			3
<i>Product decision making power</i>									X				X		2
<i>Involvement and relationship intensity</i>			X							X					2
<i>Completeness</i>												X			2
<i>Customisation of the service</i>										X					1
<i>Supply Chain vertical integration</i>				X											1
<i>Critical elements of the service marketing mix</i>									X						1

Table 2 – Main types and characteristics of dimension “PS offering orientation”

PS offering orientation	Characteristics		
Types	<i>Product Owner</i>	<i>Product User</i>	<i>Product decision maker</i>
1° <i>Product-oriented</i>	Customer	Customer	Customer
2° <i>Use-oriented</i>	PS provider	Customer	Customer
3° <i>Result-oriented</i>	PS provider	PS provider	Customer
		Customer	PS provider

Table 3 - Main types and characteristics of dimension “PS offering focus”

PS offering focus	Characteristics	
Types	<i>Relationship Intensity</i>	<i>Level of customisation</i>
1° <i>Product</i>	Low	Low
2° <i>Process</i>	High	High

Table 4 – Main types and characteristics of dimension “Nature of the interaction between the Customer and the PS provider”

Nature of interaction	Characteristics	
Types	<i>Risk</i>	<i>Price</i>
1° <i>Transaction-based</i>	Customer	Mark-up Fixed-fee
2° <i>Relationship-based</i>	PS provider	Usage-based Performance-based Result-based

Table 5 – Main types and characteristics of product-oriented services

	PS offering orientation			PS offering focus	Customer-PS provider Interaction
	<i>Product Owner</i>	<i>Product User</i>	<i>Product decision maker</i>		
Product specific services					
- pure transactional	Customer	Customer	Customer	Product	Transactional
- extended warranties and preventive maintenance	Customer	Customer	Customer	Product	Relational
- condition-based maintenance	Customer	Customer	Customer	Product	Relational
Advice/Training/Consultancy					
- on customer's product	Customer	Customer	Customer	Product	Transactional
- on customer's processes	Customer	Customer	Customer	Process	Toward relational
- on customer's business	Customer	Customer	Customer	Process	Toward relational
Internal function or BU management	Customer	Customer	Customer	Process	Relational

Table 6 – Main characteristics of use-oriented services

	PS offering orientation			PS offering focus	Customer-PS provider interaction
	<i>Product Owner</i>	<i>Product User</i>	<i>Product decision maker</i>		
Leasing	PS provider	Customer	Customer	Process	Transactional
Renting					
- short term renting	PS provider	Customer	Customer	Process	Transactional
- long term renting	PS provider	Customer	Customer	Process	Relational
Sharing	PS provider	Customer	Customer	Process	Relational
Pooling	PS provider	Customer	Customer	Process	Relational

Table 7 – Main characteristics of result-oriented services

	PS offering orientation			PS offering focus	Customer-PS provider interaction
	<i>Product Owner</i>	<i>Product User</i>	<i>Product decision maker</i>		
Pay-per use	PS provider	Customer	Customer	Process	Relational
Outsourcing	PS provider	PS provider	Customer	Process	Relational
Pay-per result	PS provider	PS provider	PS provider	Process	Relational