

Services for Value Co-Creation in Business Networks: a Case in Aerospace Industry

Autoria

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Resumo

The paper contributes to the discussion about the role of services for value co-creation in manufacturing firm's business networks. The paper explores the issue that what counts as a product or as a service is related to the nature of producer-user interactions and the institutional structure of production and networks. In this sense, service can be described as value-creating support to activities and processes and manufacturing firms needs to change their position in the goods-services continuum by continuously extending the service business to their offers. The aim of the paper is to analyse product-services combinations in a manufacturing company, highlighting the application of services for value co-creation in business networks. A case study research in aerospace industry is presented. The data were collected through a desk research involving secondary material, as articles and technical publications and interviews with managers of one major aircraft manufacturer in the world. The analysis describes the combination of products and services for a manufacturing firm that encompass a business-to-business product-service network. The paper contributes to the discussion about the servitization of manufacturing firms and also the role of services for a network based value co-creation.



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Abstract

The paper contributes to the discussion about the role of services for value co-creation in manufacturing firm's business networks. The paper explores the issue that what counts as a product or as a service is related to the nature of producer-user interactions and the institutional structure of production and networks. In this sense, service can be described as value-creating support to activities and processes and manufacturing firms needs to change their position in the goods-services continuum by continuously extending the service business to their offers. The aim of the paper is to analyse product-services combinations in a manufacturing company, highlighting the application of services for value co-creation in business networks. A case study research in aerospace industry is presented. The data were collected through a desk research involving secondary material, as articles and technical publications and interviews with managers of one major aircraft manufacturer in the world. The analysis describes the combination of products and services for a manufacturing firm that encompass a business-to-business product-service network. The paper contributes to the discussion about the servitization of manufacturing firms and also the role of services for a network based value co-creation.

Keywords

Manufacturing firm; Product-services combination; Business-to-business service network; Value-co-creation

Introduction

What is a service? According to Spring and Araújo (2009) e Araújo e Spring (2006) the quest for foundational differences between products and services is misguided. What counts as a product or as a service is related to the nature of producer-user interactions and the institutional structure of production rather than to the attribute of products or services. The product-service founded on the four (IHIP) idiosyncratic (Fisk,1993) features of services as well as process versus outcome consumption doesn't bear much scrutiny (Spring and Araújo (2009). Vargo and Lusch (2016, 2008 e 2004) emphasized this perspective by highlighting the challenge to move from a goods based logic to a service-centred logic and some studies have been developed to understand how the concepts of services are related within the business marketing field (Spencer and Cova, 2012; Gebauer, 2008; Cova and Salle, 2008; Sheth and Sharma, 2008 and Van der Valk, 2008).

Authors, such as Reinartz and Ulaga (2008), Grönroos (2007), Campbell-Kelly and Garcia-Swartz (2007), Teboul (2006), Oliva and Kallenberg (2003), and Chesbrough and Rosenbloom (2002), claimed that the market's complexity is forcing traditional product-manufacturing companies to change their position in the goods-services continuum by continuously extending the service business to their offers. From this discussion a question arises: how the combination of products and services by a manufacturing firm can be understood as related to the nature of producer-user interactions and the institutional structure of production?

In order to contribute with this discussion, the aim of the paper is to analyse product-services combinations in a manufacturing company, highlighting the application of services for value co-creation in business networks. The paper presents a case study research taking a manufacturing firm in aerospace industry and its business network as the unit of analysis. The firm analysed is one of major aircraft manufacturer in the world, named here as firm X. An

exploratory and qualitative research is developed. The data were collected through a desk research involving secondary material, as articles and technical publications and interviews with managers in the manufacturing firm X headquarter.

First, the paper presents a theoretical review about the concepts of products and service in delivering benefits to customers. The evolution of the service concept is presented. Then, a literature review about value co-creation in business-to-business service networks is described. Next, the case of Firm X is presented in order to reach the aim of the research.

2. The service concept evolution

According to Grönroos (2006), the evolution of the service-centred logic was influenced by traditional authors from the Nordic School (Grönroos and Gummesson, 1985). More recently, Vargo and Lusch (2016, 2008, 2004) discussed what they called Service-Dominant Logic (S-DL). According to the S-DL, service must be understood as the application of specialized capacities (knowledge and skills) exchanged through business relationships (Vargo and Lusch, 2004, 2008). For Grönroos (2006), service can be described as value-creating support to activities and processes. This way, according to Oliva and Kallenberg (2003) all firms have to do is adopt a unique service orientation. These approaches are similar in conceptualizing service as process for value creation by resources' interactions among the parts in relationships.

According to Gebauer (2008), Oliva and Kallenberg (2003), Teboul (2006), and Grönroos (2006), traditional product-manufacturing companies have to change their position in the goods–services continuum by continuously extending the service business in their offers. For this to happen, firms “may decide that providing services is beyond the scope of their competencies (...)” and therefore “not only are new capabilities, metrics and incentives needed, but also the emphasis of the business model changes from transactions to relationship-based” (Oliva and Kallenberg, 2003, p.161). This way, the product becomes part of the offering and the firm must develop services to support and improve continuously its use and effectiveness.

Nevertheless, according to Spring and Araújo (2009) the quest for foundational differences between products and services is misguided. What counts as a product or as a service is related to the nature of producer-user interactions and the institutional structure of production rather than to the attribute of products or services. The product-service founded on the four (IHIP) idiosyncratic features of services as well as process versus outcome consumption doesn't bear much scrutiny. This idea is based on Hill (1977, 1999) and Gadrey (2000) researches' about an institutional perspective on service definition. According to Hill (1977), a necessary condition for some item to be a good or a service is that it must be capable of being the subject of a transaction between two or more different economic units. To identify the characteristics of goods or services, the focus should be on the interaction between producers and users. According to Hill (1977, p.318), services can be understood “as a change in the condition of a unit or a person, or of a good belonging to some economic unit, with the prior agreement of the former person or economic unit”. Hill (1999) claims that a service is produced by one economic unit for another, but is not exchanged between them. Products can be disentangled from relationships and capable of independent circulation making them the ideal case for market exchange, but the outputs of services are not separate entities that exist independently of the relationship between producers and users. According to Spring and Araújo (2009, p.4), “in summary, the distinction between products and services often depends more on economic factors that determine boundaries and areas of responsibility in a producer-user interaction than on technical factors concerning production process”. This way, Delaunay and Gadrey (1987) and Gadrey (2000) developed Hill's (1977, 1999)

definition by positioning that service activity is an operation intended to bring about a change in the status in a reality C that is owned by consumer B effected by service provider A at the request of B and in a means independently of medium C. This idea is illustrated by Spring and Araújo (2009, p.449), according to Figure 1:

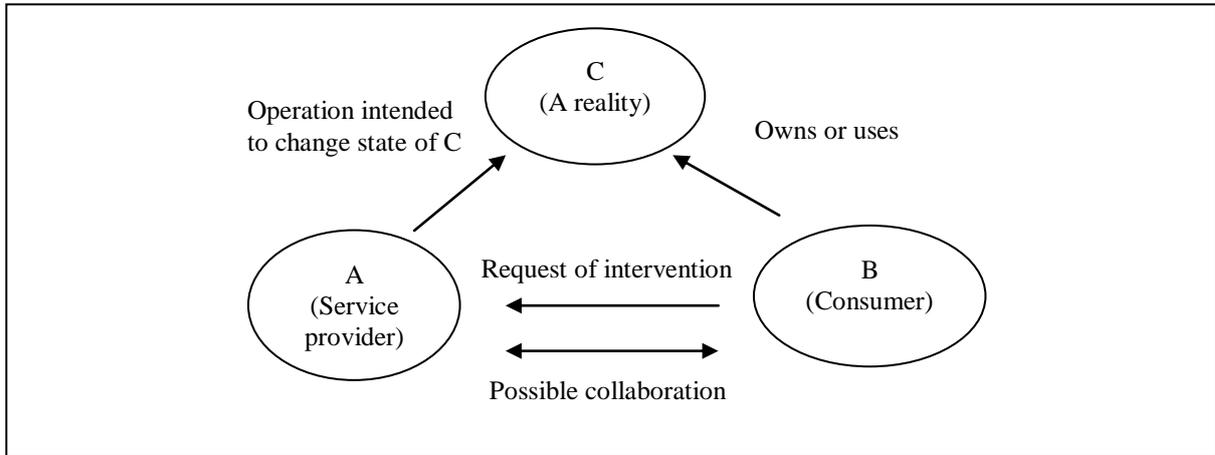


Figure 1: The service triangle
Source: Spring and Araújo (2009, p.449)

However, Spring and Araújo (2009) argue the institutional perspective notion that services cannot circulate as independent entities in a property rights and discuss about what makes services tradable at all. Spring and Araújo (2009) suggest that products and services constitute different types of intermediaries and both require ‘stabilization’ and ‘objectification’ (Callon et al, 2002) to be transacted. The objectification of an entity doesn’t require that its properties are inscribed into tangibles, solid material even though many services rely on a significant array of tangibles resources. The tradeability of a service simply requires that its properties are objectified, stabilised and delimited, i.e., making services tradable requires the regulation of access to maintain socio-technical capacities which may involve a variety of modes of interaction between service providers and users. According to Callon et al (2002), the production, circulation and use of products should not be separated forming a range of services normally associated with those activities. By this way, Araújo and Spring (2006) claims that Ford et al (2003) idea about focusing on mixed offering of product-service combination is a helpful start to overcome the service-product dualism. The business challenge for most firms is how to generate a variety of revenue streams from both product and service transactions, as the recent literature on expanding the role of manufacturing suggests (Araújo and Spring, 2006).

According to Bryson et al (2004, p.55), “manufacturing still matters, but manufacturing and services have become increasingly complementary and mutually support activities”. Howells (2000, p.15) identified two different methods by which manufactured products are not offered to consumers in their own right but, rather, as a part of a package that includes service components: a) manufactured products provided with closely aligned services, and b) the manufactured product supplied to consumers as a vehicle for accessing services, i.e. in cases where the product is not the end point of the transaction, but only the beginning of the relationship between consumer and producer. According to Howells (2000), these types of service/product relationship represent forms of what is termed ‘service encapsulation’ in which services are wrapped around or embedded in products and in which services can produce innovations in other sectors of the economy.

By this way, for Bryson et al (2004), there are four different forms to manufacturing companies transforming themselves into either partial service companies or complete service companies: I) manufacturing-service companies; II) service-manufacturing companies; III) from manufacturing to service companies and IV) virtual production companies. A manufacturing-service company (I) is a firm that has begun to sell services that are linked to physical products. This is the first stage towards becoming a full service company. A service-manufacturing company (II) still produces products but the balance of their activities is shifting towards services. Through the process of servicing, product manufacturing companies can learn and develop new products or redesign.

On the other hand, companies moving from manufacturing to service companies (III) used to produce or sell goods, but are no longer engaged in these activities. The company begins to sell knowledge-products but rapidly realise that the sale of such products is more profitable than either producing or selling goods. Finally, a virtual production company (IV) is no longer directly engaged in the physical production of products. It has closed or sold its manufacturing plants or may never has been involved in the production process. Products are designed and marketed, but the production process is undertaken by service manufacturing companies, that may not produce a product in their own right, but instead manufacture and even design products for other companies. For Spring and Araújo (2009) the process about moving from manufacturing to service companies highlights the role of the literature on Business Models (Schweizer, 2005) as a way to understand how firms can fit strategic, operational and economical decisions in order to offer products and services.

The ideas of Hill (1977, 1999), Delaunay and Gadrey (1987), Gadrey (2000) and Spring and Araújo (2009) spread out the IHIP idea (Fisk et al, 1993) highlighting that services only can be understood by relationship between actors. For authors such as Ramirez (1999), Grönroos (2006) and Vargo and Lusch (2004, 2008), service is a process that enables the value co-creation in business relationships. According to Lusch et al (2010), the literature of supply chain management and marketing have been moving from models and purposes narrowly focused on goods to more general models and purposes associated with partnerships, value networks, service provision, and value creation. The next section presents a theoretical review about these concepts highlighting the role of services in business-to-business networks.

3. Value co-creation in B2B service networks

The IMP Interactive and Network approaches show that firms are connected by relationships and are embedded in business networks (Easton, 1992; Axelsson and Easton, 1992; Easton and Araújo, 1992; Ford, 1997). The term network refers to the exchange connection between multiple firms that are interacting with each other (Ford et al, 2006). Relationships can be seen as assets that vary in terms of content, strength and duration. It implicates costs of time and money, risks, uncertainties, and dependences (Ford et al, 2006; Ritter and Ford, 2004). This way, the management of these relationships is not a linear process that leads to an ideal partnership between clients and suppliers. Both parts will try to manage the relation their own way, according to their own priorities. So, it is important to understand that the firms cannot manage the net, but can only “manage in the net” (Ford et al, 2006).

Anderson et al (1994) and Ritter and Ford (2004) emphasized that business nets are determined by the connection of relationships. For Håkansson and Snehota (1993), a relationship can be understood as an interaction mutually orientated between two reciprocally engaged parts. According to Ford (1997), business relationships can be described as complex combinations of exchanges and adaptation. The content of the exchanges can be studied

according to four types: exchanges of products/services, information, financial and social elements, which lead to a long term relationship characterized by interdependence, reciprocal adaptations and co-ordination of certain activities (Ford, 1997). Therefore, the processes of adaptation take place when one or both parts realize the potential of profit resulting from the relationship, and adapt functions, proceedings, tasks, attitudes, values, and objectives in order to obtain a better performance.

Möller and Wilson (1995) agree with this idea and claim that an interaction between supplier-buyer can be described also as a process of co-ordination. For Anderson et al (1994), a business net is built by dyadic business relationships and these are reflexes of the business net in which they are embedded. Relationships between firms may have functions divided into two different dimensions: primary and secondary. The primary functions of business relationships concern the effects, positives or negatives, for both parts that interact in a dyadic relationship. The secondary functions, named “net functions”, capture the indirect, positive or negative, effects of the relationships (Anderson et al, 1994).

In an attempt to clarify this idea, Anderson et al (1994) discuss some concepts like “net horizons”, “net context” and “net’s identity”. We can understand “net horizons” as a certain firm's perception on how far does the net in which it is embedded stretches out. The “net horizons” depend on the firm's experience and on the net's structural characteristics. This means that the horizons of the net of a certain firm change according to the business relationships it develops. According to Håkansson and Snehota (1993), the part of the net's horizon considered relevant to the firm is called “net context”, and it is structured in three dimensions: actors, activities and resources (Håkansson and Snehota, 1993). It is in the context of the net that the firm develops what is called “net's identity”, i.e. how a firm sees itself in the net and how it is seen by other members of the same net. The net's identity can indicate the appeal level of the firm as a partner for business relationships and exchanges of resources.

According to Henneberg et al (2006), managers can try to picture their companies' networks. They can describe a framework of interrelated dimensions consisting of network context, network horizon and network environment which is called as Network Picture (Ford et al, 2002). For Henneberg et al (2006), a network picture is based on players subjective, idiosyncratic sense-making with regard to the main constituting characteristics of the network in which their company operating. “These perceived network pictures form the backbone of managers' understanding of relationships, interactions and interdependencies, and therefore constitute an important component of their individual decision-making” (Henneberg et al, 2006, p. 409).

For these authors, when a manager tries to picture its business network, a set of dimension need to be analyzed: I) boundaries (what's the depth and the width of the net); II) centre/periphery (what's the main firm and the periphery of the net); III) actors/activities/resources (involving individuals, groups or whole companies); IV) focus (on actors or relationships); V) directionality (of interactions); VI) time/task (short or long term); VII) power (of relationships); and VIII) environment (influence of external aspects). Not all these elements need to be present in a network, but these dimensions can be a way for picturing a business network (Henneberg et al, 2006).

Stabell and Fjeldstad (1998) also claim that when the critical value of a firm comes from established business relationships in a net that is called value in network. Value is a well-known and venerable concept in business markets (Anderson, 2004). But, there isn't a consensus about its meaning. Sometimes it is expressed only in economical terms (Smith, 2002), other times it is represented as a set of economical and non-economical aspects, such as market-perceived quality, total savings or satisfaction received (Nagle and Holden, 2002). According to Anderson (2004), each of these constituent components takes our understanding

of the concept in a different direction. But it is only through an integrative perception of the term, i.e., by the conjunction of economical and non-economical aspects, that the process of value can be understood (Anderson, 2004).

According to Johanson and Wedin (2005), the process of value creation has been studied from the value chain perspective (Porter, 1985), constellations of value (Normann and Ramirez, 1993), systems of value (Porter, 1996) and network perspective (Stabell and Fjeldstad, 1998; Johanson and Wedin, 2005). But, according to Stabell and Fjeldstad (1998), the process of value creation can be seen in three different perspectives: “value chain”, “value shops” and “value in networks”.

To these authors value creation on a “value chain” perspective (Porter, 1985) occurs when a firm considered standardized offers and costs as the elements defining the value; “value shop” when a firm creates value through activities solving specific client problems; and, finally, “value in network” when the critical value of a firm comes from established business relationships in a net. To these authors, in this last case, value is created by activities in a network of business relationships, mediated by technologies. Thus, to them, both costs and business relationships are the driving factors of value creation. This perspective highlights the customers’ participation in the value creation process, in which service may have a fundamental role. For authors such as Ramirez (1999), Grönroos (2006) and Vargo and Lusch (2004, 2008) service is a framework (Ramirez, 1999) or a process (Grönroos, 2006; Vargo and Lusch, 2016, 2008, 2004) that enables the value creation in business relationships.

This change for the concept of service agrees with service-centred logic (Vargo and Lusch, 2016, 2008, 2004; Groonros, 2006). This way, Jacob and Ulaga (2008) state that business markets are increasingly taking over the character of service markets. But the concept of value must be understood as a process of co-creation and all firms, including manufactures, must be service providers in order to create value (Reinartz e Ulaga, 2008; Cova e Salle, 2008; Campbell-Kelly and Garcia-Swartz, 2007; Teboul, 2006; Oliva and Kallenberg, 2003, and Chesbrough and Rosenbloom, 2002). Transforming a manufacturing firm into a service provider means having to adopt a business model based on relationships and develop profitable services offers (Oliva and Kallenberg, 2003). In order to analyse product-services combinations in a manufacturing company, the case of firm X in aerospace industry is presented as follow, highlighting the application of services for value co-creation in business networks.

4. Research method

This is a qualitative and exploratory research (Vergara, 2005) developed by a case study approach (Yin, 2003). Case study research (Yin, 2003; Byrne and Ragin, 2009; Ragin, 1992) investigates contemporary phenomenon within its real life context and in which multiple sources of evidence are used. Dubois and Araújo (2007) examined the application of qualitative research and particularly the use of case studies in purchasing and supply management, and discussed single and multiple case designs. These authors considered the problems of case study research using a number of examples, formulate some rules for conducting good case research, and show several studies that relied on single in-depth studies. Dubois and Gadde (2002) and Hakansson and Erikson (1993) highlight the interest and relevance of the single case research for theory development. Some authors have argued that a single case study is justified or even preferable over some conditions (Easton, 2003; Siggelkow, 2007). According to Easton (2003) a single case study can show the impact of a large number of powerful and active contingent relations working through the particular ways in which they operate, which will be not as rewarding as using several cases. This author claims that the relationship with existing theory is important, but when little exists, then one

case can be enough to begin and develop the process of theory creation. Easton (2003) demonstrated and justified through critical realism that one case study is enough to structure the way of arguing the results of research.

This paper presents and discusses a single case research that contributes to the discussion about the role of service in manufacturing firms. The aim is to analyse product-services combinations in a manufacturing company, extending the role of business-to-business service networks for value creation in manufacturing firms. The selected case is Firm X, one of major aircraft manufacturer in the world. The data were collected by a desk research (Vergara, 2005) and interviews with managers of Firm X headquarter as described in table 2.

CODE FOR INTERVIEWEES	INTERVIEWEE'S FUNCTION	INTERVIEWS/DURATION
EBR (AIRCRAFT MANUFACTURER)		
Manager 01	Technical Coordinator. Engineering Specialization Program.	1x 3 hours + 1x 2 hours of face-to-face interviews
Manager 02	Manager, Customer Support and Services Development.	1x 2 hours + 1x 2 hours of face-to-face interviews
Manager 03	Senior Manager, Systems Engineering	1x 2 hours of face-to-face interview
Manager 04	MRO Services Engineer	1x 1 hour of face-to-face interview
Manager 05	MRO Services Engineer	1x 1 hour of face-to-face interview

Table 1: describing the interviews
Source: authors

Secondary material, as articles and technical publications functioned as a significant source of information, against which the comments and opinions of the interviewees were reflected. In the next section, we present the uniqueness of the case study selected: a firm whose business essence is to supply diverse clients with designing, manufacturing, selling and supporting aircraft for the global airline business, which results in a web of multiple business-to-business relationships, involving the Firm X service network. The analysis shows a good illustration of a global service-manufacturing firm, with subtle relationships that make up the web.

5. Presenting the case

The manufacturing firm X is one of the largest aircraft manufacturers in the world. Firm X is a company with 40 years of experience in designing, manufacturing, selling and supporting aircraft for the global airline, defense and business aviation markets. It produced already around 5.000 aeroplanes, and operates in 88 countries, in five continents. Firm X develops its activities in order to compete in a global market, offering specific aircrafts to three segments: commercial, defence and executive aviation. For each segment, firm X produces specific aircrafts also offering services to support those businesses.

In order to attend these markets, Firm X has headquarters and offices, subsidiaries and customer service distributed around the world. Aircraft and aircraft parts production are made in national units, including sales, logistics and repair management of aircraft parts and technical and operational support. Foreign units works in warehousing, sales, logistics and repair management of aircraft parts and technical and operational support. The process of manufacturing an airplane can be divided into five stages: Suppliers, Manufacturing parts,

Fuselage assembly, Final assembly and Delivery. Each one of them involves different activities in order to develop the airplane, step-by-step, according to Figure 2:

MANUFACTURING STAGES OF AN FIRM X AIRPLANE				
SUPPLIERS	MANUFACTURING PARTS	FUSELAGE ASSEMBLY	FINAL ASSEMBLY	DELIVERY
<u>Step 1:</u> Raw Material	<u>Step 2:</u> Stretch-forming the fuselage skin <u>Step 3:</u> Shaping and adjusting	<u>Step 4:</u> Surface treatment and corrosion-resistant coating <u>Step 5:</u> Structural assembly of a major component <u>Step 6:</u> Sealant <u>Step 7:</u> Fuselage mating <u>Step 8:</u> Installation of wiring, tubing and ducts	<u>Step 9:</u> Fuselage painting <u>Step 10:</u> Major component assembly <u>Step 11:</u> Final outfitting <u>Step 12:</u> Ground tests <u>Step 13:</u> Production flight	<u>Step 14:</u> Documentation and delivery

Fig. 2: Manufacturing stages of an Firm X airplane
Source: authors

These are general stages followed to produce an Firm X aircraft, to commercial, defense aviation and executive use. In order to support its customers and provide after-sales services, Firm X developed Aviation Services business unit, which encompasses aircraft maintenance, spare parts, training and aeronautical systems. Aviation Service unit is divided into different activities: Field Support, Technical Support, Maintenance Engineering, Operational Support, Maintenance Services, Material Support, Technical Publications and Training, according Fig.3.

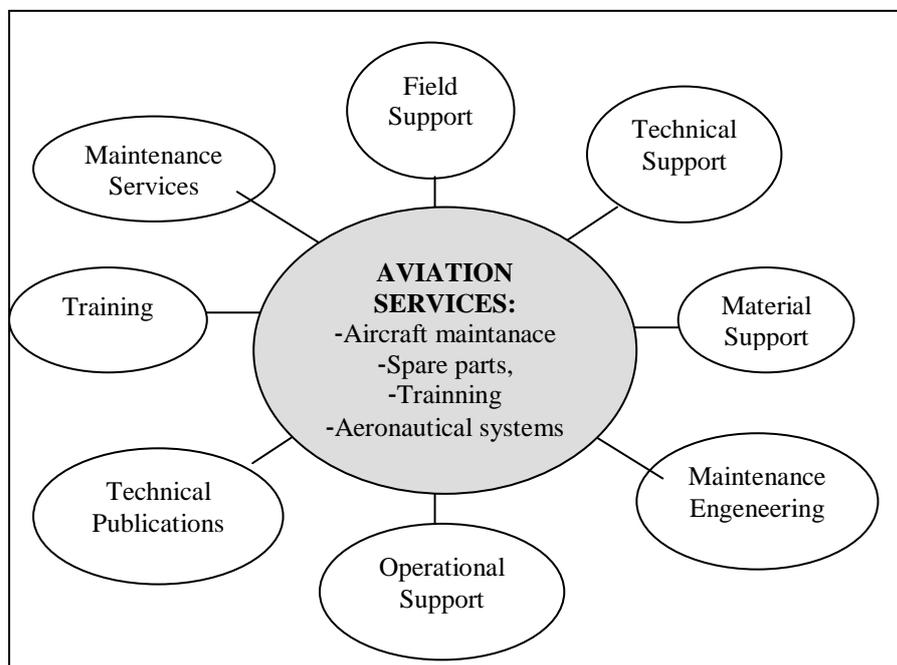


Fig. 3: Aviation services offered by Firm X
Source: authors

The revenue of the firm comes from operations to these three market segments and from customer support, including after-sales support for parts, services, and technical assistance. According to Firm X, Commercial aviation segment represented the major firm's revenue per segment (66,7%), followed by Executive aviation (14,3%), Customer Support (10,4%) and Defense systems (6.9%). In terms of revenue, these numbers highlights that services, offered by Customer Support activities, represent plus then manufacturing activities revenue coming from Defense systems. Firm X is a company that works in designing, manufacturing, selling and supporting aircraft for the global market. The next section describes Firm X as a service-manufacturing firm, also providing evidences about the combination of products and services by a manufacturing firm, extending the service concept in this context.

5.1 Business-to-business product /service network in firm X

The case of Firm X highlights interesting issues about product-service arrangements. Firm X describes itself as a company that works in designing, manufacturing, selling and supporting aircraft for the global airline. By this way, the combination of products and services at Firm X can be understood according to Bryson et al (2004), for which manufacturing and services have: I) become increasingly complementary and II) mutually support activities. Firstly, Firm X offers services (as designing, selling and supporting activities) and products (manufactured aircrafts) in a complementary way, in order to attend aviation markets. This case is an empirical evidence of Ford et al (2003) idea about focusing on mixed offering of product-service combination as a helpful start to overcome the service-product dualism. On the other hand, Firm X also offers services by support activities (Aviation Services), in order to support its customers and provide after-sales service. This service and business unit encompass aircraft maintenance, spare parts, training and aeronautical systems, as was showed before (see Fig. 3), which increase the value of use of the Firm X products, i.e. the aircrafts. Thus, the Firm X combination of products and services highlight how service is related with manufacturing firms. Firm X Aviation Services are developed to provide continuous value-added to customers, and are an evidence of Lusch et al (2010) ideas about service as processes for value creation by resources' interactions among parts in relationships. For the other side, Firm X Aviation Services also illustrates the ideas of Hill (1977, 1999), Delaunay and Gadrey (1987), Gadrey (2000) or Spring and Araújo (2009) about the institutional perspective on service definition. For Delaunay and Gadrey (1987) and Gadrey (2000) service activity is an operation intended to bring about a change in the status in a reality C that is owned by a customer B effected by a service provider A at the request of B and in a many independently of medium C. Fig. 4 shows the Firm X service triangle, i.e. the Firm X activities according to this analysis:

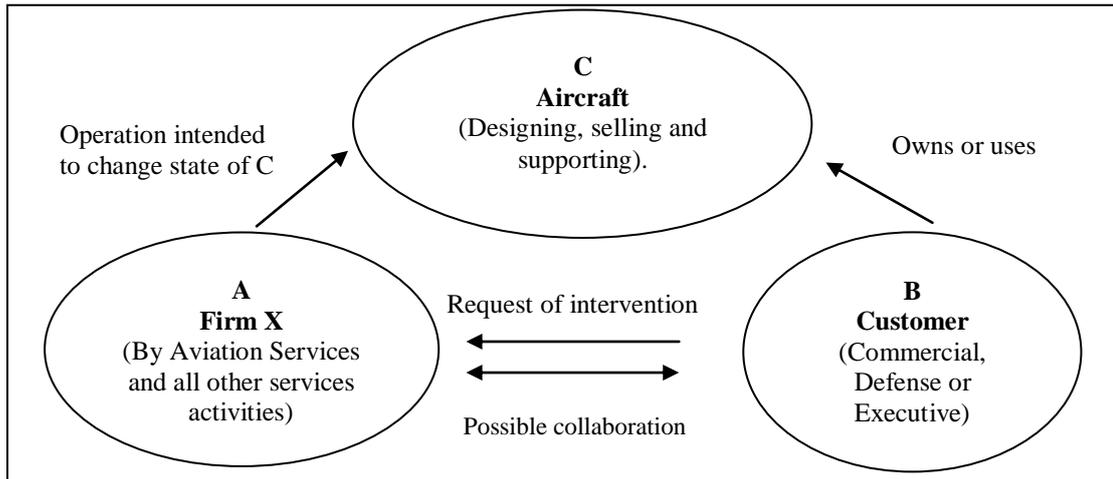


Fig. 4: The Firm X service triangle
Source: authors

As a service provider, Firm X (A) offers services (Aviation Services and all other services activities) intended to bring about a change in the status in a reality C (about designing, selling and supporting), which is owned by Customer B (for commercial, defence or executive use). Services activities are developed by request of intervention and/or possible collaborations. Acquiring an Firm X aircraft, customer has much different kind of support and after-sales services that can be also developed in collaboration within it, by a dedicated team in order to provide value addition. According to Spring and Araújo (2009), making services tradable requires the regulation of access to maintained socio-technical capacities which may involve a variety of modes of interaction between service providers and users, as we can see in Firm X Aviation Services business unit.

According to the idea about “service encapsulation” (Howells, 2000), Firm X can be seen as a company providing manufactured products with closely aligned services. By this way, according Bryson et al (2004) concept for four different forms to manufacturing companies transforming themselves into either partial service companies or complete service companies, we can understand Firm X as a service-manufacturing company: Firm X produce products but the balance of their activities is shifting towards services. Through the process of servicing, product manufacturing companies can learn and develop new products or redesign, what can be seen among Firm X, customers and suppliers relationships. According to Oliva and Kallenberg (2003), moving from a traditional product-manufacturing company to extending the service business imply not only in new capabilities, metrics and incentives, but also in the emphasis of the business model changes from transactions to relationship-based, as we can see in Firm X. By this way, Firm X service triangle can be an example about how service provision is directly associated with partnerships, in order to get a business-to-business network for value creation (Lusch et al, 2010). In order to work in designing, manufacturing, selling and supporting aircraft for the global airline, Firm X is developing a series of interactions among its own service units as well as with customers, suppliers and partners. A simple illustration about this is done in Figure 5, describing interactions among one customer, Firm X’s units and its suppliers:

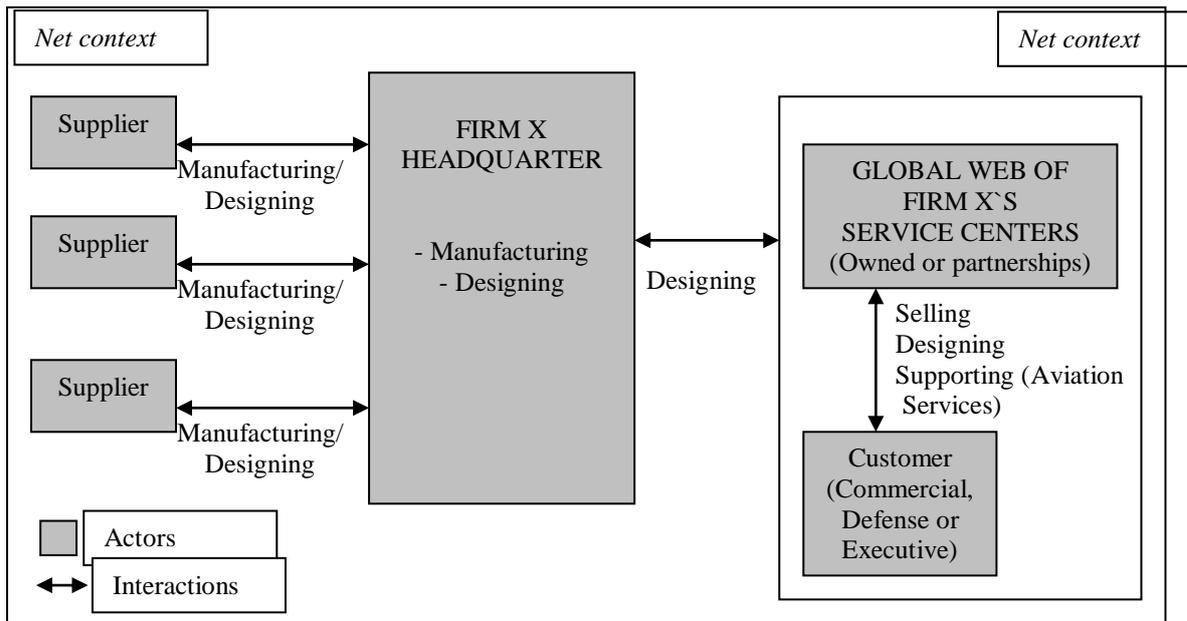


Figure 5: Simple illustration of interactions involving designing, manufacturing, selling and supporting activities
 Source: authors

According to Vargo and Lusch (2016, 2008 e 2006), if the concept of service is the process of exchanging skills and competences, the combination of products and services at Firm X is not limited to the business unit known as Aviation Services (developed for support activities). There are processes of services that are related to the activities of designing, manufacturing, selling, in addition to supporting. When the client needs to some adaptation (designing), the exchange of skills and competences (as process of services) are needed. The exchange of skills, competences and know-how among Firm X and suppliers is what enables the delivery of the aircraft with the necessary adjustments. By this way, the role of services to manufacturing firms can be extended to a network application. According to IMP Interactive and Network approaches, the term network refers to the exchange connection between multiple firms that are interacting with each other (Easton, 1992; Axelsson and Easton, 1992; Easton and Araújo, 1992; Ford, 1997). Thus, for the service provision, there is a network that is “developed”, which includes clients and partners (as service centers), but also suppliers, and the “suppliers of the suppliers” etc. In addition to the network that is built around the supply of products (tangible goods), co-exists a network related to service provision. Both networks are likely to exist in a combined way in order to ensure the provision of value propositions to all actors who are part of the network. The Firm X service triangle can also highlights the issue about business-to-business service networks. The Firm X case can illustrate that there is a business-to-business service network constituting the net horizon, the net context and the net identity of a manufacturing firm (Håkansson and Snehota, 1993). The main point here is that when traditional product-manufacturing companies, like Firm X, try to change their position in the goods-services continuum by continuously extending the service business to their offers, they probably also “develop” a B2B service network that will influence (and constitute) the B2B network that exists around the product. As a service provider, a manufacturing firm can probably have to attend this B2B service network.

6. Final considerations

The case of Firm X can be seen as an empirical evidence of product-service combination in a manufacturing context, highlighting the application of services for value co-

creation in business networks. The paper shows that as a manufacturer, Firm X offers activities and processes to develop and to support its products. Thus, developing service activities, Firm X turned itself into a service-manufacturing firm, which works to and/or within its customer and suppliers allowing the creation of value. The application of specialized capacities (knowledge and skills) is done by Aviation Services business unit and by any other type of services, exchanged through business relationships. Firm X is a case study that contributes to the discussion about how a manufacturing firm can generate a variety of revenue streams from both product and service transactions. The analysis done showed how designing, manufacturing, selling and supporting aircraft for the global airline business results in a business-to-business service network, which is a good illustration of a global service-manufacturing firm with subtle relationships that make up the web.

This paper presents an exploratory research that was developed in order to provide a better understanding about product-services combinations in manufacturing firms. This is a case study research that is limited for conclusions. But, this study can be a useful example for manufacturing managers trying to extend service business to their offers. It also highlights that service, as the application of specialized capacities (Lusch et al, 2010) may happen beyond the specific business units for the provision of services such as Firm X's Aviation Service. For managers, this idea may help to understand that there are "indirect" service processes that should also be taken into account because they probably influence the supply of the final product.

Further exploratory and descriptive research can be developed. Maybe the Henneberg et al (2006) idea about how to picture a business network can be a start point in order to describe the business-to-business network involving all services processes. The challenge to managers in manufacturing firms is to try to focus on mixed offering of product-service combination (Ford et al,2003), understanding their network pictures (Henneberg et al, 2006) as a framework of interrelated dimensions including all product/services relationships.

From this paper, some questions arise for further investigation: how to picture a business network describing product/service combination in manufacturing companies? Firm X is a case of a service-manufacturing company that offers services to reach its aims besides manufacturing. However, service business-to-business networks for manufacturing companies need to be understood for different product-service combinations that are related to the nature of producer-user interactions and the institutional structure of production and networks (Spring and Araújo, 2009). Does each one of the four different forms (Bryson et al, 2004) to manufacturing companies transforming themselves into either partial service companies or complete service companies involve different dimensions to picture the network? Trying to picture the business-to-business service network can be an empirical way to show how to transform a manufacturing firm in a service provider. Moving from a manufacturing firm into a service provider is still a challenge for managers, but is a way to obtain competitiveness.

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