7th Industrial Product-Service Systems Conference - PSS, industry transformation for sustainability and business

PSS Characterisation of Telecom Offerings

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Abstract

The global telecommunication network provides a powerful infrastructure supporting a multitude of offerings. As early as the 1980's the telecom industry had moved to services using telecom products that could be provided within the offers (a gateway included in the offer) or by the customers themselves (a computer to access the web). However, although modern telecommunication systems are often considered as good support for Product Service Systems (PSS), telecom carriers hardly refer to PSS when establishing their own offers. Indeed it is not always easy to understand how modern telecom services, using personal mobile phones and other objects, really fit with PSS philosophy. This paper evaluates telecom offerings from a PSS standpoint. Current telecom offerings are compared with PSS characteristics found in literature. The results clarify the potentials of current telecom offerings in the PSS paradigm.

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Peer-review under responsibility of the International Scientific Committee of the 7th Industrial Product-Service Systems Conference - PSS, industry transformation for sustainability and business

Keywords: PSS; ICT; telecom service; environment

1. Introduction

As early as in the 1980's, the telecom sector began to shift efforts from mastering technology to selling services. Indeed, modern telecommunications depend on high-tech micro-electronic equipment and the technologies used are so widespread today that they no longer justify as much research efforts by telecom carriers. The carriers now consider themselves as providers of information channels and emphasise on selling Kbits instead of material. This is called dematerialisation and the business models tend to resemble Product-Service Systems (PSS). Indeed the carriers concentrate efforts to satisfy client needs and most of the products used to provide services are in the telecom network infrastructure that remains the property of the carrier. However this is not completely true as many telecom services make use of customer provided products such as personal computers or mobile telephones. Considering that the telecom industry is becoming a big consumer of electricity today and that it needs to improve its environmental impact, telecom carriers are pushed to examine

new, more sustainable, business models. In this paper, a telecom carrier, backed by academic researchers, explores the potentialities of introducing PSS models to the sector. The paper proposes to clarify the situation of current telecom services in the light of PSS criteria. Starting from a literature review, the paper points out the main characteristics of PSS offers as they are generally expressed in literature and seeks to understand how far these characteristics are relevant in current telecom offerings. For this, the study first identifies different PSS characteristics underlined in literature and elaborates a methodological questionnaire to be applied to telecom offers. The offers are assessed and the key elements defining the telecom offerings in a PSS context are identified. The offers evaluated were chosen from current business-to-business (B2B) and business-to-customer (B2C) offers. The aim is to understand PSS potentialities of telecom offers opening the way for introducing PSS in the sector.

This paper evaluates how far current telecom offerings match with PSS models. It evaluates telecom offerings using

PSS criteria. It demonstrates that PSS criteria found in literature can be used to characterise telecom offerings. It shows to what extent telecom offerings match with PSS models.

The paper is organised as follows. Part 2 resumes current literature. Part 3 concerns the choice of the offers evaluated and discusses telecom particularities that have to be considered. Part 4 explains how the evaluations were carried out and part 5 discusses the main finding. Part 6 concludes the paper.

2. Literature Review

After a brief overview of the telecom situation, the paper explores how PSS is viewed by different authors.

2.1. Telecommunications

The economic crisis, the necessity to save energy, scarcity and price of raw materials put increasing competition and pressure on companies today [1,2]. It becomes all the more necessary to decouple economic growth from the use of resources [3,4]. In this case, to continue activity, companies have to open their offers and reconsider their business models [5]. One way to do this is to providing services instead of selling products [6].

The telecommunication industry has not been spared, and although Information and Communication Technologies (ICT) (Internet, telecom networks, equipment…) are often considered a lever that may improve sustainability when used correctly [7,8,9]. The sector is fast growing and telecom equipment is more common. It often includes micro-electronic devices that draw growing environmental concerns [10]. A change to the "economic framework" with a new contract is therefore necessary [11]. PSS should help progress to more sustainability. However, even though telecoms adopted services as early as in the 80's [12,13] only few articles speak about PSS for telecoms [14]. Indeed, it is not easy to understand how modern telecom services using mobile phones and other such personal objects, comply with the PSS concept.

2.2. PSS Characteristics

Stahel introduced the concept of functional economy in a service society, optimising the function of goods and services and managing existing resources [15]. The idea was to improve the social, economic and ecologic performances of business solutions by creating value in use for the customer; reducing material and energy resources and managing the solution over its full lifecycle [15]. Selling the function would contribute to the development of eco-products, dematerialised products, remanufacturing and, more globally, sustainability [15].

From the point of view of management, Roth and Menor studied service strategy according to 3 axes: the concept; the target market; and the service delivery system [16].

PSS contain physical products and service units [3,15,18]. Products can be part of the PSS infrastructure [20]. Included products (proposed in the offer, but not part of the infrastructure) [6] are distinguished from supporting products (customer provided products) [16] and by their conditions of use (personal or shared) [17,19]. Different services are proposed in the offers, such as telecom [17,20], technical [6,21], informative services [22] and knowledge management services [23,24].

The delivery system refers to the organisation of the offer; marketing strategy; and client interfaces [16]. The organisation of the offer [3] defines interaction between the offer and the staff. It includes the infrastructures [3,18,20] and relations with the supply chain [16]. The nature of the contract (long- or short-term, or payment by use …) is fundamental [17,18,25]. The innovation potential [6] and the modularity and upgradability of the offer are also important [3,26]. The relations that the provider keeps with the supply chain and the customers are also significant [16].

PSS must discern client typology (B2B or B2C) [24,27]. For products included in the offer, ownership has to be considered [18,21,25] along with the risks taken to move to PSS [6,21].

One important reason for considering PSS models in business offerings is due to the environmental potentials they permit [17]. Offers are subject to environmental regulations [24,28]. Physical products are mainly concerned because they most often display strong environmental characteristics [3,6,18] while PSS can potentially improve environmental performances along the life cycle of the offer [24,17]. Finally, it is widely considered that telecommunications lead to dematerialisation [15,20]. In this paper, a dematerialised telecom offering is defined as the sale of data services without using included or supporting products.

3. Telecom Offers

The study focuses on current market offers proposed by a French telecom carrier. Practically only offers proposed in developed countries were studied and specific offers targeting certain markets, such as third world markets, have not been considered.

3.1. The Panel of Offers

Table 1 – A panel of telecom offerings

	Portfolios	Offers
B2C	Accessories & Equipment	3
	Landline	1
	Mobile	2
	Autonomy	1
	Internet & TV & Phone	2
	Services	1
	USB internet dongle	2
	Internet & Mobile	1
B2B	Unified Communication & Collaboration	8
	Customer Contact Solutions	4
	Mobiles France & International	5
	Consulting and Client Services	6
	Internet & Network	6
	IT Solutions & Services	1
	Professional Services	3
	Safety	1
	Job solution	1
	Health	2

The study investigated a catalogue of over 400 telecom of-ferings. These offers had already been classified in B2B or B2C portfolios (see table 1). There were 90 B2C (21.5%) and 327 B2B (78.5%) offers. From there a panel of 50 offers was selected, globally respecting the distribution of B2B and B2C, as well as the relative importance of each portfolio. This led to 26% of B2C and 74% of B2C offers (Table 1).

3.2. Telecom Particularities

Initial evaluation of the offers pointed out telecom particu-larities that should be considered in order to evaluate PSS characteristics correctly.

It is first necessary to differentiate the telecom network from customer premised equipment. The telecom network refers to the global telecom infrastructure consisting of tele-phone lines; mobile and other networks; equipment such as transceiver stations and switches.... This network is an particu-larity of telecom offerings and practically all telecom services are accessed through the network. Customer premise equip-ment is equipment located on-site in customer premises. This equipment is necessary to access the telecom offers and is usually owned by the carrier. Customer provided equipment usually belongs to the customer and is used to access the ser-vices. In this paper, a product included in the offering refers to equipment that is provided in the offering. A supporting prod-uct is equipment that is not included in the offering but that is necessary to access it. These products can belong to the cus-tomer, or be provided by a third party. For example, many offers assume that the client already owns a computer for internet access. We may also remark that certain products used in offers can be considered by the customers as personal ob-jects. This is a subjective criterion that can be attributed to certain types of products for certain kinds of clients (for ex-ample in B2B or B2C offers). A typical example is mobile phones. The mobile phone is also a fashion object that is used both frequently and individually.

Another particularity of telecoms is that many services can be installed remotely. Software and web-sites are often used to help. Client interfaces of telecom carriers are provided in many different ways including hotlines, agencies and software services.

4. A Grid for Analysis

A grid was constructed to characterise the telecom offers.

4.1. Construction of the Evaluation Grid

The research structure is adapted from the Service Strategy Triad proposed by Roth and Menor [16]. It uses the three axes that they proposed. As the study also focuses on sustainable transformation of telecom offerings, an Environment axe was added. Indeed, in sustainable PSS offerings, environmental characteristics must be covered along with social and econom-ic aspects (the latter are at least partially integrated in the Service Strategy Triad). Figure 1 shows the grid structure.

In the first axe, the Product-Service Concept, we will find the characteristics of the products and the services forming the offer. Network products are distinguished from included and supporting products as defined in section 3.2, although the network is examined later on in the delivery system. The con-ditions of use specify whether use is shared or personal. The different services of the offer are also identified.
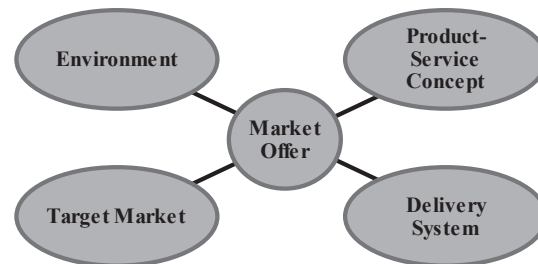

Fig. 1. Structure of the Analysis Grid.

The Delivery System refers to the organisation of the offer [3], the marketing strategy and customer interfaces [16]. Infra-structures are accounted here. The relations with the client as well as with the supply chain actors are defined. The nature of contract covers the term of the contract (long- or short-term) and the type of payment (cash, pay by use, etc.). Innovation potential covers three different aspects: the physical products (e.g. technology), the services provided (e.g. new services for customers), or market innovation (e.g. if the application sector is new for the telecom offer). In this study, an estimation of the innovative potential is compared to other existing market offers. Particularly, in the strongly competitive telecom sector, even though offers may use highly innovative technics, they often become standard offers very rapidly. Modularity and upgradability are also considered as factors that indicate the adaptability of the offers.

The Target Market determines the characteristics of the market. The first element to be considered is the typology of clients targeted by the offering. This can be B2B or B2C. The property of the products in the offer is defined and the proper-ty transfer issues are identified. The risks from moving to a PSS offer are estimated in this grid by weighting seven issues studied elsewhere in the grid. The major risks aggregated were considered to come from: (1) the use of personal objects in the offer; (2) unadapted internal organisation within the company; (3) weak client relationships; (4) unclear marketing strategy; (5) obsolescence or other factors that would reduce the lifespan of the products prematurely; (6) difficulties to transfer ownership of the products from the customer to the provider; and (7) other risks linked to market frivolity. The evaluation of these risks is difficult and the study does not pretend to be exhaustive. The risks are estimated as a value between 0 and 1. When risks are over 0.5 points it is considered that there are significant risks involved in the change to PSS business mod-els.

The Environmental aspects are an important issue for both PSS and telecoms. The study determines the existence or ab-sence of environmental regulations which may be applied to the offer. Factors affecting the lifespan of the products are examined and potential environmental improvements during

the life cycle are also investigated. Offers that are already dematerialised are also identified. In the study, a dematerialised telecom offering is defined as the sale of data without the sale of products in the offer.

Some other points that could have been further covered concern sustainable dimensions concern social values and economic advantages. However these aspects have not been fully treated as such in the scope of this study and were left out of the grid where they were not covered by the other elements of the grid.

Finally, the characteristics of PSS identified in literature and used in the evaluation are summarised in Table 2.

Table 2. Principal PSS characteristics in literature

Product-Service Concept	Delivery System	Target Market	Environment
Included Product	Infrastructure	Client typology	Regulations
Supporting Product	Provider Relationships	Owner	Lifespan
		Risks	Dematerialisation
Personal products	Supply chain relationships		Environmental improvements
Mutualised products			
Telecom Services	Contract		
Technical Services	Innovation		
Informative Services	Modularity and/or Upgradability		
Knowledge Management Services			

The table represents the different criteria that determine PSS characteristics of telecom offerings. Each criterion is considered evenly in what follows to appreciate the closeness of the offers to PSS.

4.2. Evaluation

For each criterion, the offers were evaluated through simple questions. A score between zero and one was then obtained by aggregating the responses to the elementary questions. In order to characterise current telecom offerings for each criterion the average scores from all the offers was used.

The grid covers 50 different offers and more than a hundred elementary questions. It was therefore filled up separately by two researchers and supervised by an experienced telecom researcher working in the telecom carrier company. Full access to the characteristics of each particular offer was made available by the telecom carrier. The results were crosschecked and checking strings were included to ensure the reliability of the study. Different points of view were confronted and corrected.

5. Characterisation of Telecom Offerings

To appreciate globally the telecom offers through the PSS criteria, the results for each offer have been aggregated to display the relevance of each criterion. Final scores were obtained by averaging the results from the 50 offers. The final results are displayed in the ring diagram (Figure 2). The ring diagram displays the characteristics of an average telecom offering from a PSS viewpoint. The results for each particular offer may be far different from the result depicted in Figure 2. However the figure shows how the average telecom offering complies with the PSS model described through the selected criteria, highlighting its strengths and weaknesses. In the figure all the criteria are represented. To distinguish the different axes, the Product-Service Concept and the Target Market are shown with dark black arcs covering the corresponding criteria. A higher score means that the offer tends to favour a PSS model. To facilitate comprehension, the risk criterion has been replaced by its complement, "low risks".
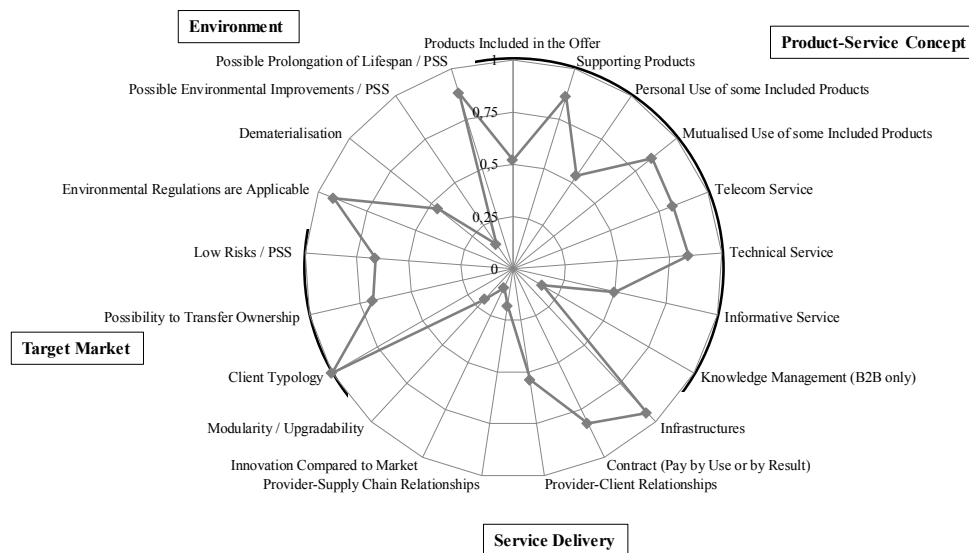

Fig. 2. Ring Diagram displaying the Characteristics of Telecom Offers.

5.1. Product-Service Concept

PSS offers should provide services through the use of physical products. The study shows that telecom offerings use the telecom network and other physical products to support different services. The physical products can be included in the offer (included products) or can support the offer (supporting products). However in the current telecom offers, supporting products are more often present than included products. If the telecom carrier wanted to provide an offer through using PSS business models, it would be better to supply all the different products so as to follow them up more efficiently during their complete lifecycle.

Furthermore, included products are often the property of the customer and difficult to share. They are sometimes considered, by the customers, as personal objects that do not comply with PSS standards. However, the global telecom networks are mutualised and remain the property of the carrier.

Services are strongly present in all the offers. However, more knowledge management services, which show good potential in PSS, could be introduced alongside the usual communication and other technical services.

5.2. Delivery System

To manage PSS, a good and efficient organisation is needed. The telecom infrastructures (networks) are a strong point to help to deliver the offers. Almost all the offers make use of them and they form the backbone of telecom offers. Internal organisation should also facilitate delivery and favour contact with the clients: most offers use internet and remote monitoring, resulting in less human contact with the customers. This point should be considered as it could be a handicap for PSS.

The contract models found in telecom offerings are often, at least partially, pay by use. This should be generalised for PSS and telecoms should also turn to pay by result models where the performance of the offer is paid rather than the capital used.

Closer relationships with the supply chain would help the telecom carrier fulfil client needs better. Offers should integrate know-how from the supply chain and partners should not be reduced to simple subcontractors but should contribute to set up more efficient design and operation of the offerings. This should lead to more innovation. Innovation is a strong driver to convince the customer to accept new business models. Innovation is not a distinctive point for telecom offerings. This is because the telecom market is very competitive and so, even though telecoms use high-technology products, market differentiation is difficult and does not last very long.

Modularity and upgradability of the products and services should also be improved. Literature shows the benefits of the modulation and upgrading but these criteria are only validated in few telecom offerings.

5.3. Target Market

A strong point in telecom offers is the identification of customers. Offers are directed to specific sectors and client typol-

ogies that must be correctly identified. To provide PSS solutions, a precise knowledge of the customers targeted is necessary. The study shows that telecom offers are all very well identified. B2B and B2C offers are clearly distinguished. Indeed, each category has its own specificity and approaches to PSS may be different. The study shows that risks in moving to PSS are generally reasonable for telecom offering. This is especially true in B2B offers although less so in B2C cases.

The study shows that the transfer of the ownership of products from the customer to the carrier may be possible for many offers in spite of the presence of personal products (mobile phones …) in other offers. Globally the study shows that risks of moving to PSS are also reasonable for many offers. This is especially true in B2B offers but less so in B2C cases.

5.4. Environmental Issues

Most of the offers use electronic devices, with batteries or accumulators, screens and printed circuits. They are therefore subjected to environmental regulations and PSS should facilitate these issues.

Although literature highlights environmental potential when moving to PSS, the study shows little potential for the reduction of environmental impacts with PSS business models. This point may be underestimated in the study due to lack of information and further research would be necessary for particular cases. However, the study shows good potential for PSS to extend the lifespan of many physical products, and this would help environmental issues.

Telecoms are seen as a potential lever for the environment because they tend to be dematerialised. However the study shows that this is only partially a reality as many offers still include products that are sold to the clients.

6. Conclusion

According to literature, PSS can provide sustainable gains for the actors involved. However moving from a traditional business model to PSS would require transforming the offers. To understand the gaps between telecom offerings and PSS this study provides a method to characterise current telecom offerings through PSS criteria extracted from the literature. The first step was to extract relevant PSS characteristics from a telecom point-of-view. Then, 50 telecommunication offerings were analysed to evaluate the gaps and similarities between these current offerings and the different criteria from PSS literature.

Some of the criteria reveal the similarities between current telecom offerings and PSS. For example, both rely on physical products and service units with a certain organisation. Target customers of telecom offers are well defined. At the same time other criteria highlight differences with many of the offerings. For example, a particularity of telecom offers is the presence of supporting products and personal objects. The study also points the lack of modularity and/or upgradability of the products and the weaknesses of supply chain relationships. The study shows that risks involved in the transition to PSS vary between the offers. In particular, more detailed analysis re-

vealed that the conversion of B2B offers to PSS models is less risky. As for environmental performances, although telecom offerings are sometimes dematerialised today, they still incorporate supporting products. The main potential for environmental improvement in PSS would be the possibility to prolong the lifespan of the products when they are included in the offer.

The study points out that some current telecommunication offerings match most of the PSS criteria. Close attention should be paid to these offers to understand how close telecom offering might come to PSS and how environmental gains could result from this business model.

Finally the study shows that it is possible to characterise telecom offerings in a PSS perspective using criteria derived from literature. Further research would be necessary to test this approach in other industrial sectors.

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