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HOW ARE PRODUCT-SERVICE COMBINED OFFERS PROVIDED IN GERMANY AND ITALY? – ANALYSIS WITH COMPANY SIZES AND COUNTRIES *

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Abstract

A new business concept that offers products and services in a different way of traditional product-sales businesses is getting more attention especially in manufacturing industries. This paper investigates how this new business by means of integration of products and services is achieved in Germany and Italy. In addition, it analyzes the differences according to the company sizes. The results include that this type of business is in many cases motivated by their focus on customers and often consists of physical products and their maintenance. The Italian companies, as opposed to the German ones, often design their physical products specifically for this type of offers. From the analysis based on the size difference, small companies are found to achieve specific design for this type of offers while owning physical products. There do not seem to be any established methods or tools developed to support the development of such offers and within such methods/tools there would be room for more adaptation in form of physical product design.

Keywords: Product-Service Combination, Functional Sales, Integrated Product Service Engineering, Service Management, Product Design, Maintenance

1. Introduction

The importance of services gets larger as the economy of our society becomes matured. Service activities are provided as the source of

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core value in the tertiary industry. In addition, the secondary industry recently has got more and more interested in services (e.g. (Mathieu, 2001, Oliva and Kallenberg, 2003)). Examples of those new businesses are seen when a copier manufacturer sells service of copied papers by the amount of photocopies instead of copy machines and when an engine provider sells working flight hours instead of aircraft engines.

Simultaneously, new concepts as ways of more comprehensive manufacturing business such as Functional Sales (Lindahl and Ölundh, 2001, Ölundh, 2003, Ölundh and Ritzén, 2003, Sundin and Bras, 2005), Product/Service Systems (PSS) (Goedkoop et al., 1999, Morelli, 2003, Tukker and Tischner, 2006), Functional Products (Alonso-Rasgado et al., 2004, Alonso-Rasgado and Thompson, 2006), Integrated Product Service Engineering (IPSE) (Lindahl et al., 2006a), and Service/Product Engineering (SPE) formerly called Service Engineering (Arai and Shimomura, 2004, Arai and Shimomura, 2005, Sakao and Shimomura, 2007) have been developed so far. For instance, the business concept of Functional Sales can be defined as "*…to offer a functional solution that fulfils a defined customer need. The focus is, with reference to the customer value, to optimize the functional solution from a life-cycle perspective. The functional solution can consist of combinations of systems, physical products and services*" (modified from (Lindahl and Ölundh, 2001)). In common to these four concepts, service activities are trying to be incorporated into the design space, which has traditionally been dominated by physical products in manufacturing industries (see e.g. (Sundin and Bras, 2005, Sundin et al., 2005a, Lindahl et al., 2006b, Sundin, 2007)).

This is already highly remarked especially in the area of so-called life cycle design and engineering (LCD/LCE) (e.g. (Alting and Legarth, 1995)). LCD tackles environmental problems such as waste processing and global warming from the design perspective. The degree of environmental impacts originated from physical products depends fairly on how those products are used. Thus, services in LCD have been focused (Lifset, 2000) and LCD has reasonably tried to handle services in the product design (e.g. (Luskin and Blackman, 2007)).

On the contrary, several types of research activities have been achieved to solve various problems in the tertiary industry by applying engineering technologies (e.g. (Tien and Berg, 2003, Bullinger et al., 2006)). It should be noted that these activities are relatively new; in the former periods (until the eighties) very few (e.g. (Shostack, 1984)) dealt with engineering methods applied to services.

In the marketing field, a related paradigm shift is already observed (Vargo and Lusch, 2004). Vargo and Lusch point out that a new logic for marketing based on service-centered model of exchange has emerged, while goods-centered model of exchange was dominant in the past.

In reality, products and services in industries affect each other on the same "boat", and a structural change in industries is underway shifting the focus from production of products to production of services (Sundin et al., 2005b). Within this paper a rather broad definition of Functional Sales is used; for instance, businesses dealing with renting, leasing and similar concepts are included. The term used to express Functional Sales in the survey explained later on is “product service combination”.

Since this type of business concept is still in its infancy, there is a lack of empirical data about its practical application. The authors have been conducting an industrial survey in order to analyze how companies are approaching this concept. Although a preceding study was achieved in Sweden and Japan (Sundin et al., 2005b), more data is needed in order to incorporate studies from other countries with different industrial context.

This paper explores how this new business is achieved in Germany and Italy. It investigates according to the company sizes and to the countries.

2. Research Questions

Upon the exploration, five research questions (RQ) regarding how companies address product-service combined offers (P-S offers, hereafter) in Germany and Italy are defined as follows. The first three RQ investigate the current situations in German and Italian industries as a whole. Especially, obtaining answers to RQ 3 is approached from the perspective of development of P-S offers, which allows us to compare with the corresponding results in Sweden and Japan (Sundin et al., 2005b).

RQ 1. Why are P-S offers provided?

RQ 2. What are provided in P-S offers?

RQ 3. How are P-S offers provided?

RQ 4. Are there any differences on providing P-S offers between the providers´ sizes and, if so, what are they?

RQ 5. Are there any differences on providing P-S offers between in Germany and in Italy and, if so, what are they?

3. Research Method

3.1 Scope

The authors carried out a wide-ranged investigation rather than a narrow and deep one to understand the global situations of the various industries in both Germany and Italy. Therefore, a structured questionnaire was used as a method to collect data. It also gave good possibilities to represent the results in a quantitative manner. Thus, the results will be analyzed quantitatively according to both company sizes (“small” size for a company with employees fewer than 50, “medium” for those between 50 and 1,000 and “large” for over 1,000) and countries. Furthermore, some analysis of comparing the results in Germany and Italy with those obtained previously from 26 companies in Sweden and Japan (Sundin et al., 2005b) will be shown.

3.2 Questionnaire

The method used for obtaining the empirical data described in this paper was a paper-based questionnaire survey (either faced by a questioner or not). The survey consisted of 56 questions altogether. It was a dynamically-structured questionnaire, i.e. the respondents’ answers affected which subsequent questions to answer. By using these dynamic questions, most of the respondents did not need to answer all the questions, since many were not relevant for their kind of business. For example, if the company did not have any product remanufacture, the respondent was not asked any questions about their remanufacturing business. Having this type of structure and these types of questions made the survey much quicker for the respondents to complete.

In order to obtain answers from the participants that were as accurate as possible, the authors carried out the Italian survey in the Italian language. The questions were first written in English and later translated into Italian. However, the German survey was achieved in the English language due to their relatively good skills of English.

3.2 Company Selection

Since this type of business concept is still in its infancy and it is quite difficult to find companies working with such business, approaching a greater number of companies would not easily give accurate insights. Thus, in this study, the authors selected companies in their countries (Germany and Italy) for the following reasons:

- Previously established company contacts.
- Increased convenience in communicating with respondents, since they are in the similar situation as researchers.

In Germany, mostly manufacturing companies who established previously contacts with researchers at Darmstadt University of Technology, Germany were selected. In Germany, 6 companies were contacted with the request of the survey, while 4 of these (67%) completed the survey.

In Italy, the survey was carried out by University of Rome "La Sapienza" and some companies from different industrial sectors. As for the size of participants, 7 (70%) have employees less than 100 as a total number, which is in line with the average size of Italian organizations. In Italy, 18 companies were contacted with the request of the survey, while 10 of these (56%) completed the survey. See also Table 1.

Table 1 The participants' degree of responding the survey

Country	Sent	Completed	Coverage Ratio
Germany	6	4	67%
Italy	18	10	56%

4. Survey Results

4.1 Profile of the Respondents

As shown in Figure 1, the respondents are 4 small, 6 medium, and 6 large companies. In addition, the majority of the respondents in Germany are companies with more than 1,000 employees. On the other hand, those sizes in Italy vary from below 20 to over 1,000.

A question was asked in order to find out what kinds of sections in companies participated in the survey. The respondents answered as shown in Figures 2 and 3. From large companies, the majority of the participating sections are in charge of manufacturing. Those from small and medium sized ones vary.

Both in Germany and Italy, the majority is from the manufacturing section. The products manufactured by German companies include business-use electromechanical equipments, expensive investment machines, and home appliances. Those by Italian ones include credit cards, roasted coffee, pharmaceutical products, mechanical products, paper, supporting equipment for education and terminals for lottery.

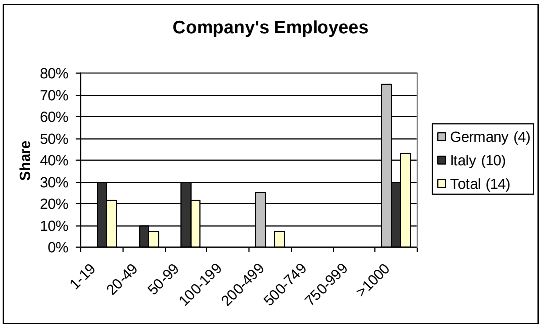

Figure 1 The number of employees of the surveyed companies

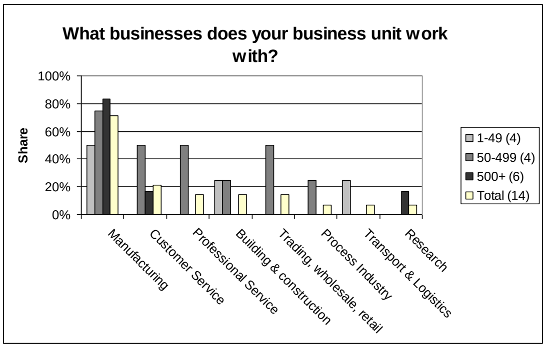

Figure 2 Business areas of the surveyed sections (by sizes)

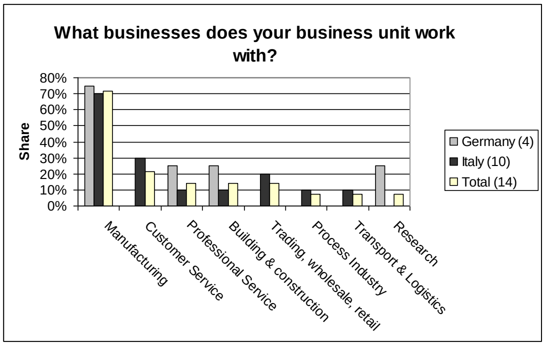

Figure 3 Business areas of the surveyed sections (by countries)

4.2 Ratio of P-S Offers in Companies

In order to find out how large the business with P-S offers is at the analyzed companies, the participants were asked how much of their total turnover was related to such business. For this question, 3 answers of the 4 in Germany were obtained: Two (2) respondents (one medium and one large companies) answered that less than 10% of their total company turnover was related to such offers. The other one (a large one) respondent answered that their company had 30% of the company turnover related to Functional Sales. In Italy none of the respondents answered this question. Potential reasons for this are that the contacted persons did not have a specific knowledge or that this is confidential information.

Furthermore, the participants were asked how many offers were being sold annually. Two (2) answers were obtained in Germany: One large company sells between 100 and 1,000 and one medium company does over 1,000 offers annually. In Italy, none of participants answered to this question, for the same potential reason as the previous question.

4.3 Identified Driving Forces

One of the objectives of the survey was to identify driving forces connected to this type of business. Figure 3 shows that, both in German companies and Italian ones, many incentives for such business are connected to the customer, in coherence with the equivalent survey achieved in Sweden and Japan (Sundin et al., 2005b). This result points out companies' attention to customer satisfaction, also referring to the possibility to establish closer and long-lasting relationships with business customers.

Other identified driving forces include (in decreasing order):

- Increased competition,
- Decrease costs, and
- Improve company brand.

On the other hand, improving environmental image and achieving more product knowledge do not seem to be important driving forces for the companies. This is interesting in light of the fact that those two last mentioned often are highlighted in theoretical Functional Sales literature (e.g. (Lindahl and Ölundh, 2001)).

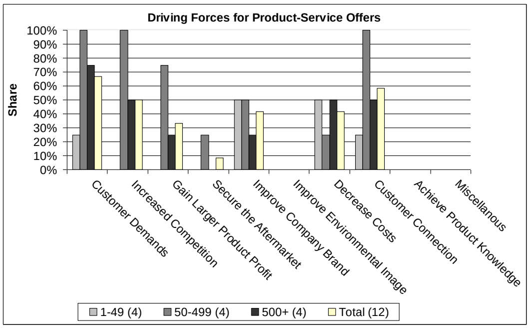

Figure 4 Driving forces to P-S offers (by sizes)

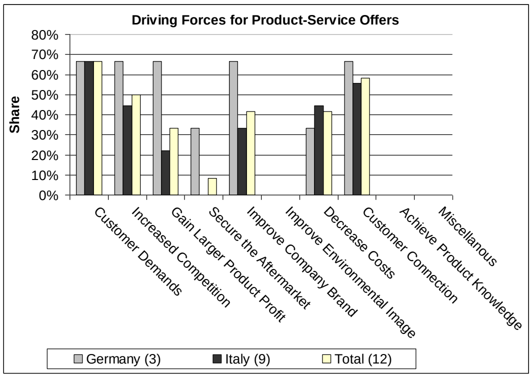

Figure 5 Driving forces to P-S offers (by countries)

It is interesting to find the difference according to different company sizes. As shown in Figure 4, the top two forces of small companies are “improve company brand” and “decrease costs”, whilst the top three of medium/large ones are “customer demands”, “increased competition”, and “customer connection” (Note that “decrease costs” is also included in the case of large companies.). This does not mean those two groups recognize totally different forces. Rather, they are different ways of looking at the forces. Medium/large companies see their driving forces more in relation to customers.

4.4 Contents of P-S Offers

In the survey, contents of product-service combined offers were also investigated. The three main parts of the offers seem to be

- Physical products,
- Maintenance, and
- Repairs.

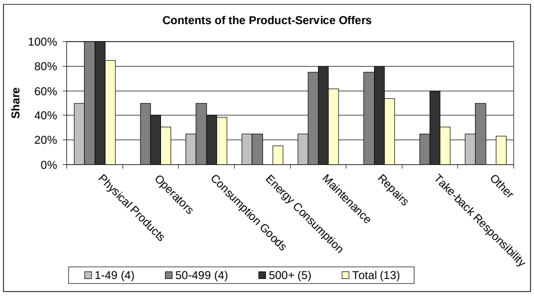

Figure 6 Contents of the P-S offer (by sizes)

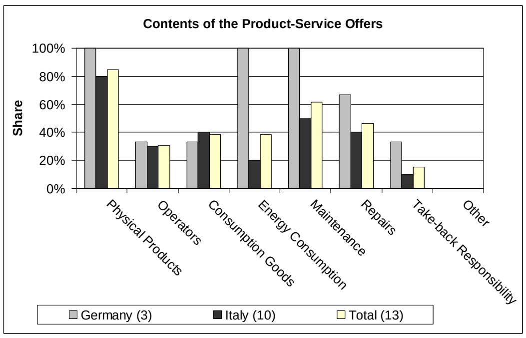

Figure 7 Contents of the P-S offer (by countries)

Figure 6 shows that those three are the

contents which most medium/large companies include. Figure 7 shows that responses from German and Italian companies are quite similar, except that German companies always include energy consumption in their P-S offers. However, the low number (3) of German respondents on this question makes that difference uncertain.

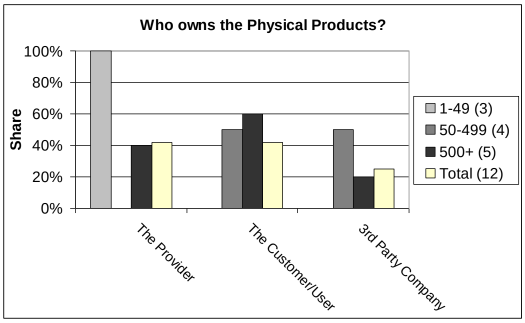

Figure 8 Physical product ownership after signing contract (by sizes)

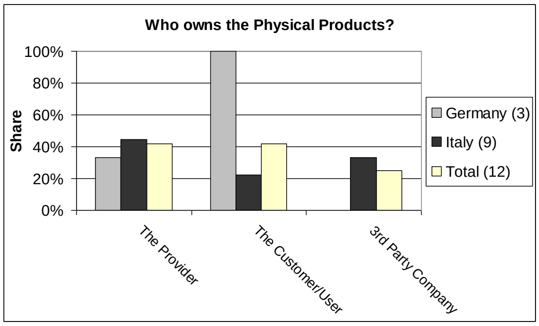

Figure 9 Physical product ownership after signing contract (by countries)

4.5 Physical Products

Looking at the physical products included in the Functional Sales offer, it was interesting to find out who owned the physical products when the contract had been signed. Figure 8 shows difference between small and medium/large companies: All the small ones own the product, quite a few medium/large ones give ownership to the customer/user. Those small companies sell their services to customers upon their own products. Figure 9 shows that the “traditional” sales-typed contracts seem to be normal in Germany while various types of contracts are found in Italy.

The ownership of the customer reduces the possibilities and potential profits for the manufacturer to adapt their physical products for the use and remanufacturing phases since improvements for these phases will not gain any profits for the manufacturer. In addition, the control over the products during use can be worse if the ownership is transferred to the user. The issues of how to adapt products for Functional Sales and remanufacturing is further elaborated on in (Sundin and Bras, 2005, Sundin et al., 2005a, Sundin, 2007).

Furthermore, the authors were interested in what manner physical products are adapted for Functional Sales. To find the answer to this question, the participants were asked: “*To what degree have the included physical products been adapted to the product-service offers?*” Figure 10 shows again difference between small and medium/large companies: Most small ones achieve “design for P-S offer”, while the majority of the medium/large utilize standard products. Figure 11 shows that in Germany all the products employed in this type of business are standard products, not adapted. As opposed, in Italy the products employed are equally standard products designed for sale of product and products designed specifically for this type of offers.

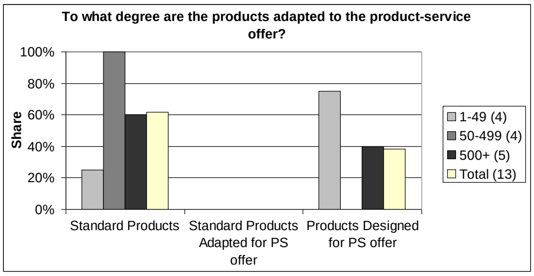

Figure 10 Product adaptation towards P-S offers (by sizes)

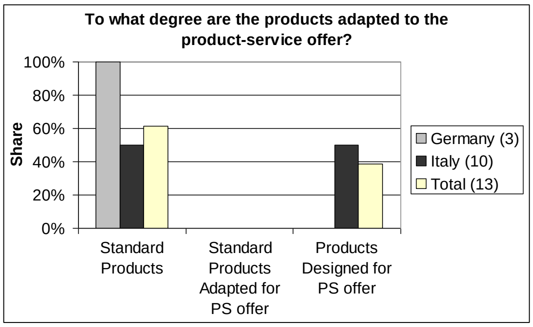

Figure 11 Product adaptation towards P-S offers (by countries)

4.6 The Development Process

Figure 13 shows that the most common departments that are involved in the design of P-S offers are product development, marketing and, only for Italian companies, production one. Answers for “Other” include sales department and product line management one in Germany. It is interesting to see that both the product development and the marketing departments in German companies are often included in the development work but, as seen in Figure 11, the physical products always are standard products.

Figure 12 shows that difference between small and large companies: A production department is the majority for the former, while product development, marketing, and after sale departments are for the latter.

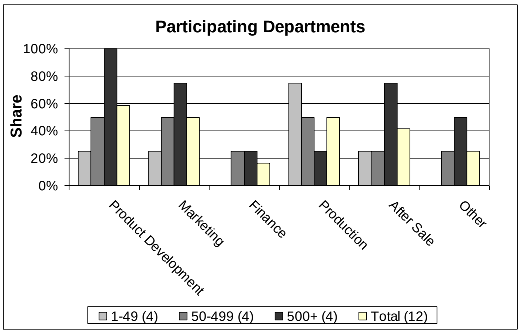

Figure 12 Participating departments in the design of P-S offers (by sizes)

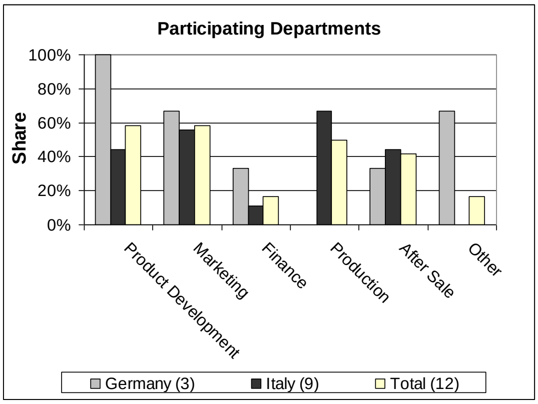

Figure 13 Participating departments in the design of P-S offers (by countries)

Similar pattern shown in Figure 13 is obtained when asking participants which department holds the responsibility for the development of P-S offers, as Figures 14 and 15 show. Rather, clearer contrast should be pointed out at the same time: The majority in Germany is the product development, while those in Italy are production and marketing.

It was also interesting to see if companies were using specific methods for developing physical products for their Functional Sales offers. Hence, the participants were asked: “*Is any specific method utilized for developing the product-service offer?*”

As shown in Figure 17, all of respondents in

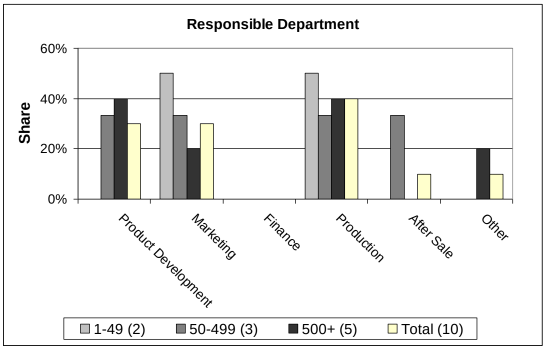

Figure 14 responsible departments for the design of the P-S offer (by sizes)

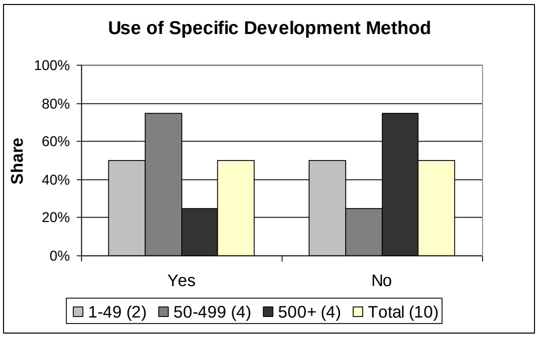

Figure 16 Use of specific development method for P-S offers (by sizes)

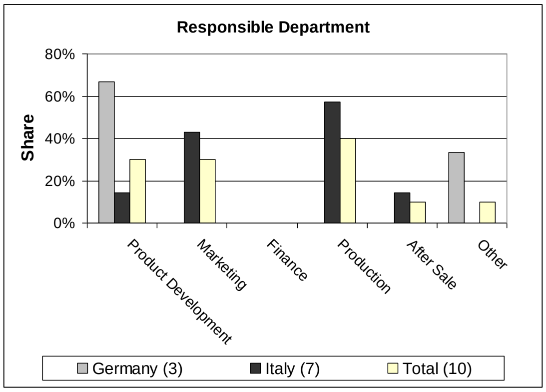

Figure 15 responsible departments for the design of the P-S offer (by countries)

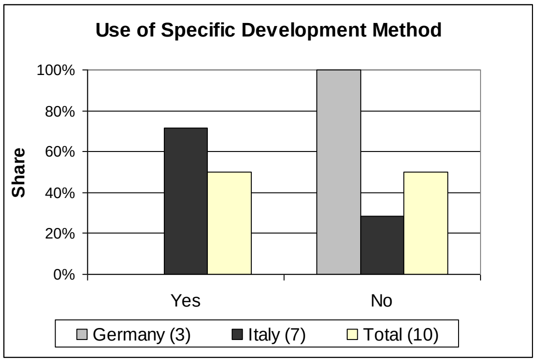

Figure 17 Use of specific development method for P-S offers (by countries)

Germany answered that they are not using a specific development method for P-S offer. As opposite, the most part of respondents in Italy (5 out of 7: 71%) uses a specific development method, according to the result shown in Figure 17. Moreover, participating respondents were asked which kind of specific method they were using. However, none of the 5 companies in Italy specified the used method.

A second follow-up question explored whether the participant was satisfied with the method used. Among the 5 Italian participants using specific methods, 4 companies (80%) stated that they were satisfied with the method.

5. Discussion

The first research question (RQ 1) was about the identification of the driving forces of P-S offers. As for this point, the survey shows that top three driving forces are increased competition, decreasing costs, and improving company brand. At the same time, many incentives for Functional Sales business were connected to the customer, in coherence with the equivalent survey achieved in Sweden and Japan (Sundin et al., 2005b). This result points out these companies' attention to customer satisfaction, leading to the possibility to establish closer and longer-lasting relationships with business customers. This is one type of phenomenon of manufacturers achieving this type of business. This implies that how to achieve customization (Hart, 1995) may be among the critical issues for such companies.

The results referred to the second research question (RQ 2. "*What are provided in P-S offers?*") are also in line with the Swedish and Japanese ones (Sundin et al., 2005b): The Functional Sales include in fact in most cases physical products and often their maintenance. The survey shows that more than 60% of respondent organizations (5 companies out of 10 in Italy and 3 out of 3 in Germany) include maintenance of products in the offers.

Integrating the implication obtained from the two previous paragraphs, i.e. the closer/longer relationships with customers and the importance of maintenance, designing products with the least-frequently-requested maintenance or on-line maintenance (e.g. (Lee and Wang, 1999)) may be a key in Functional Sales.

As for RQ3, "*how P-S offers are provided*", the previous surveys (Ölundh and Ritzén, 2002, Sundin et al., 2005b) showed that in most cases physical products were standard products not adapted for Functional Sales. On the contrary, this survey revealed that especially small companies often achieve specific design for this type of offers while owning physical products. It should be noted the owners of the products varied among the provider, the customer, and a third-party company.

In the Italian-German surveys, mainly two departments of product development and marketing were involved in the P-S offer development whereas among the Swedish and Japanese companies the department of "after market" had equally large share of the involvement (Sundin et al., 2005b). In Sweden, the aftermarket department also had the responsibility of the development of the P-S offers at one third of the companies in contrast to the results of this survey in Germany and Italy.

Regarding the usage of development method, a half of the companies use a specific method, while the other half does not. It should be noted that no German companies used a specific one, however, the recognition of a "specific method" might be different between in Germany and Italy.

As for the company size (RQ 4. "*Are there any differences on providing P-S offers between the providers´ sizes and, if so, what are they?*"), difference was actually found. Large/medium companies relatively often regard the customer demands, increased competition, and gaining larger product profit as the driving forces, whilst small ones rarely do. More large/medium ones include operators, maintenance, repairs, and take-back responsibility in the P-S offers, while fewer small ones do. The ownership of the physical products often belongs to small-sized providers as opposed to the situation of medium/large ones. In addition, small companies more often design products specifically for the P-S offers than medium/large ones.

It is interesting to find distinction between small and medium/large companies, rather than between small/medium and large ones. This trend was seen in Figures 4, 6, 8, and 10. Namely, the number of employees around 50 is more likely to be a landmark to view how this type of business is achieved.

In terms of countries (RQ 5. "*Are there any differences on providing P-S offers between in Germany and in Italy and, if so, what are they?*"), the Italian companies, along with Japanese companies but as opposed to the German ones, seem to be advanced at adapting their physical products for P-S offers. This result, such as the use of a specific method for developing Functional Sales offers (in 5 of 7 respondents in Italy), indicates that the Italian companies are approaching the business concept of Functional Sales in a methodical and "dedicated" way. This is also shown by their higher degree of "function seller": The Italian companies had the largest share of product ownership in all of the studied countries. If companies begin adapting or even customizing products, there might be stronger need of a specific method of developing offers.

It should be noted that the German, Swedish, and Japanese companies were mostly from a large (or giant) scaled company whilst most of the Italian ones were not (they were mostly less than 100 employees). The remarkable characteristics found in Italy can be caused by the company sizes. This may be a reasonable assumption because the companies in Italy carry out their business in a more "flexible" way than in the others, although this must be investigated further. However, further investigation is needed in order to get more reliable and stronger data about how companies are working with Functional Sales.

6. Conclusion and Further Research

This paper showed that the development of Functional Sales offering has many similarities to ordinary product development, since driving forces are alike as well as the design methodology. As explained above, some new influence on manufacturers from introducing P-S offers is actually analyzed. Design activities of the whole business including maintenace etc. to maintain customer relationships, not merely of physical products, are needed. However, there do not seem to be any established methods or tools developed to support the development of Functional Sales offers. When establishing such activities, it should be noted that there is room for more adaptation on the current physical product design.

As shown in Section 5, there are differences according to company sizes and coutnries. However, further studies in this area are needed in order to get more insights about how companies are working with Functional Sales. Thus, this paper together with (Sundin et al., 2005b) should be regarded as a starting point to understand the industrial situations.

Future research for Functional Sales exists in a vast field related to business models, value creation, marketing, pure service, and so on. The boundaries to other research fields than traditional science/engineering are getting blurry and many aspects of other professionalisms must be taken into account (Sakao et al., 2008).

Future research may include for example specific investigation of the operational maintenance methods to be offered by the companies (e.g. breakdown or corrective maintenance, planned maintenance, condition based maintenance, etc.) and to be preferred by the customers. Comparison with the activities in the tertiary industry would be interesitng as well.

The researchers of this paper will continue to do studies regarding Functional Sales in their conutries. In parallell, these authors invites other researchers to do complementing studies in line with this study in their own countries.

7. Acknowledgments

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