



Paper to be presented at the DRUID Academy conference in Rebild, Aalborg, Denmark on January  
15-17, 2014

## **Service offerings and service innovation in manufacturing companies**

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### **Abstract**

Measuring service innovation:

For the Doctoral workshop in Druid Winter Conference 2014 I propose the following:

Is it possible to improve the statistical measure of service innovation? an initial investigation.

Based on survey data gathered for the European manufacturing survey in 2009 and 2012, I will try to investigate the current measure for service innovation.

Litterature:

Manufacturing companies can have many different reasons for including services in their offerings. Two of the more prominent are inclusion of services to obtain a sustainable competitive advantage that can't be threatened by low cost producers of the tangible product (Baines 2009). Another and more positive in a future perspective is the opportunity to create growth, by the creation of new markets (Berry et.al. 2006) as many product markets has seen saturation and even decline in the last decade, inclusion of services has been seen as at path to growth of the company.

Though the inclusion of services in the product offer of a tangible product - ?servitization? (Vandermerwe et al, 1988, Baines 2009), ?service infusion? (Brax, 2005), ?integrated solutions? (Davies et al, 2007), ?hybrid offerings? (Ulaga and Reinartz 2011) and ?Product/service-systems?(Goedkoop et.al. 1999) at first glance can seem simple, the reality of companies trying out the concept indicates something else.

All research in the area agrees that product innovation and service innovation are different (van Biema et.al. 1997) The main reason is caused by differences inherent in the traits of products and services (De Jong et.al 2003, Johne 1998, Hipp et.al 2005). Johne (1998) lists three primary traits, that differentiate services from products:

- 1) Intangibility
- 2) Heterogeneity
- 3) Simultaneity

Though the differences are recognized the conclusions drawn are very different. One string of literature acknowledges the differences, but put the emphasis on the many similarities that they also find (sirilli et.al 1998) in this approach the consensus is that the measurement of service innovation should assimilate to that of New product development, this approach is named the assimilation approach (Drejer 2004). Another string marks the opposite position in the demarcation approach (Drejer 2004) the consensus is that the differences warrants special measures this position is

argued by authors like Hipp and Grupp (2005) and Ettlie and Rosenthal (2011).

Proposed work:

Based on the data from the EMS 2009 and 2012, This work will try to investigate how and what is measured by the current statistical operationalisations of service innovation. It is obvious that the statistical measure does not reflect the Demarcation line of theory at all. Both the Community Innovation Survey (CIS), carried out in Denmark by statistics Denmark, and The European manufacturing survey, that has been carried out in both 2009n and 2012 by the Integrative Innovation Management group, at University of Southern Denmark. Service innovation is measured by a measure that has been adapted from the Product innovation measure outlined by the Oslo manual currently in its 3<sup>rd</sup> edition from 2005. In both of these surveys the companies are asked whether they have introduced new services to the market within the last three years to measure service innovation. In addition to this variable to measure service innovation the European manufacturing survey has also included a question on turnover provided by services.

First result show that the level of new services is quite stable with a total of 19% of companies in Denmark answering yes to new services in 2012 compared to 22% in 2009. A brief contact to Other European partners in EMS survey confirms the level of service innovation to be stable and around the same 20% in several countries.

One of the interesting features of the EMS is a block of eight specific service offerings where the production companies are asked whether they offer these. Previous work on services in productions companies has used these services as a cumulative measure, where more offered services has been indicative of a higher service orientation by the production companies.

It does seem though that some services are more relevant in some sectors than others, it therefore seems relevant to investigate whether certain service offering combinations are a more relevant indicator of service orientation. Than others, and if we in a larger sample on a European level will be able to identify certain service offering combinations that indicates higher service innovation in specific sectors.

**Abstract:**

The project is titled “Measuring Service Innovation – Indicators and empirical evidence for the development of a statistical measure of service innovation I product related services”.

Several theoretical fields are in these years converging in a conclusion that the combined offering of products and services can be beneficial to companies. These hybrid offerings provide new possibilities to manufacturing companies that has been facing stagnant and declining market in recent years.

An important part needed to enable management to strategic handle hybrid Product service offerings, is a reliable and valid measure of the innovation in these. The data will be collected so that they provide the initial basis for a thorough scale development.

The project will be supervised by Prof. Mette Præst Knudsen, primary supervisor, and assist. Prof. Rene Chester Goduscheit secondary.

## Introduction

Since 2008 I have been working at the IIM research group as market analyst involved in the data collection of the European Manufacturing survey (EMS). In this period I have attended the partner meetings in the EMS project group, and have found the ongoing work by the partners within the service area interesting. At the same time it has sometimes been frustrating that while process- and organizational innovation, is measured through elaborate batteries referring to the use of innovative technologies and organizational concepts in the company. Service innovation is measured by the standard offered in the Oslo Manual which is still questioned as the 'right' measure.

Even though it seems that

## Research Gap

When Gloria Barczak in 2012 was appointed editor of Journal of Product Innovation Management (JPIM) she wrote an article on the future of innovation research in this article she specifically points to the fact that there is a need to address whether the findings from NPD and Innovation can readily be transferred to service innovation.

Several authors point to problems in the measure for service innovation. The most interesting is probably found in the guide for surveys in the innovation area The Oslo-manual (OECD, 2005). In the manual it is recognized that:

*"Innovation activity in services also tends to be a continuous process, consisting of a series of incremental changes in products and processes. This may occasionally complicate the identification of innovations in services in terms of single events, i.e. as the implementation of a significant change in products, processes or other methods"* (Oslo manual 2005 p.38 §111)

In spite of this the recommendation of the Oslo manual is to measure service innovation by asking for new or significantly improved products/services for a given period of not be less than 1 year and not more than three years. Drejer (2004) elaborate on these problems but it is noteworthy that the CIS since her article hasn't changed significantly, the survey has assimilated service innovation to product innovation and included services as a product in the questionnaire (see Appendix A).

Velamuri (Velamuri et.al. 2010) also show the need for quantitative data on service innovation of hybrid offerings. The article identifies 169 articles for the area but only 10 percent has a quantitative foundation, two of these articles are based on EMS data.

There are different opinions on how to handle service innovations. The front lines are clearly marked by two opposing standpoints. The first is the Assimilation approach, in which the differences between New product development (NPD) and New service development (NSD) is not seen as significant enough to validate different measures (Drejer 2004, Sirilli et.al. 1998). Second stands the Demarcation approach where i.e. Hipp and Grupp (2005) argues that the established measures for innovation used in product development can't be used in NSD (Hipp et.al. 2005 Ettlie 2011)

With this article I wish to analyze the following two research questions:

1. How does the current measures for innovation work in the measure of innovation of hybrid product/service offerings?
2. Which parameters should a quantitative measure contain to measure hybrid offerings?

### Literature and theory:

Manufacturing companies can have many different reasons for including services in their offerings. Two of the more prominent are inclusion of services to obtain a sustainable competitive advantage that can't be threatened by low cost producers of the tangible product (Baines 2009). Another and more positive in a future perspective is the opportunity to create growth, by the creation of new markets (Berry et.al. 2006) as many product markets has seen saturation and even decline in the last decade, inclusion of services has been seen as at path to growth of the company.

Though the inclusion of services in the product offer of a tangible product - "servitization" (Vandermerwe et al, 1988, Baines 2009), "service infusion" (Brax, 2005), "integrated solutions" (Davies et al, 2007), "hybrid offerings" (Ulaga and Reinartz 2011) and "Product/service-systems" (PSS)(Goedkoop et.al. 1999) at first glance can seem simple, the reality of companies trying out the concept indicates something else. The apparent 'simplicity' of innovating via the inclusion of services could be caused by the facts that 'easy' lies inherent in the service concept from the beginning of times (Levitt 1981, Zeithamel 1981), these pioneer authors see Services as 'high touch'/'low tech', meaning that the offering of service demanded many 'hands' and that the service was produced in the user/provider interaction and as such couldn't include technically advanced solutions. This view is changing though as also technology infuses service offerings (Bitner et. Al. 200).

The theory on the innovation of services and through this also on product/service hybrids is very fragmented. This can be seen clearly in the many different Literature reviews published on what is basically the same topic in recent years (Velamuri et.al. 2011, Baines et.al. 2009, Johne et.al. 1998) the reason for the many reviews seem to be that many different theoretical fields is converging in the recognition that Product/service hybrids is an interesting area for research.

All research in the area agrees that product innovation and service innovation are different (van Biema et.al. 1997) The main reason is caused by differences inherent in the traits of products and services (De Jong et.al 2003, Johne 1998, Hipp et.al 2005) Johne (1998) lists three primary traits, that differentiate services from products:

- 1) *Intangibility* – Service as a general rule doesn't have a physical entity, they main component of a service is the process and not it's physical entity. The intangibility also has implication in relation to new service development as service innovations can't be patented; successful NSD's are likely to be copied.
  - 2) *Heterogeneity* – The quality of services vary, a derivate of the intangibility is that the service is used simultaneously with the production in an interaction between the user and staff of the producer. This means that the quality of the service varies even with a standardized service offering staff and customer will vary.
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- 3) *Simultaneity* – The fact that consumption and use happens in same instant as production makes the service implicate that it can't be stored – this trait in the service offering makes capacity an important aspect of the PSS offering, as demand is either met or lost.

The general consensus of the research based on these assumptions, is that to become a successful PSS provider you need to change the strategic focus from the product to the PSS (Foster and Whittle 1992), in the sense that manufacturers understand that they are not offering a product with an attached service. The research done on product and service hybrids shows that the hybrid offering from the company viewpoint should be seen as one entity (Vladimirova et al 2011) this warrants a definition of the product service hybrid that encompasses both the differences between NPD and NSD but also sees the hybrid as one offering, this definition is provided by Gustavsson and Johnson (2003):

*An activity or series of activities of a more or less tangible nature that normally, but not necessarily, takes place in interaction between a customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems.*  
 (Gustavsson and Johnson 2003)

Though the hybrid offering is seen as one entity I believe that it is important to keep a focus on the relation between the service and the product in the offering. In this respect it is important to be aware that the content of the service varies, especially when speaking of product related services. I will therefore include a specification the product/service relation to get a more detailed understanding of what the service relates to the product based on the traits of the service offering it makes sense to focus on the relation between PSS-customer and PSS-supplier. Both of these can focus either on product (single transaction) or on an ongoing relationship (performance over time). Both Rogelio Oliva and Robert Kallenberg, (2003) and Ulaga and Reinartz (2010) describes the product/service relation by these two dimensions

Table 1

		Customer focus	
		Transaction (The good)	Process (Performance over time)
<b>Supplier focus</b>	Transaction (do a deed)	Product life cycle services (PLS) – Basic services eg. <ul style="list-style-type: none"> <li>• Documentation</li> <li>• Transport to customer</li> <li>• Hot line / help desk</li> <li>• Repairs and spare parts</li> <li>• etc.</li> </ul>	Process support services (PSS) – Professional services eg. <ul style="list-style-type: none"> <li>• Process engineering</li> <li>• Process oriented training and consulting</li> <li>• Business oriented Training and consulting</li> </ul>
	Relation (performance of product over time)	Asset efficiency services (AES) – Maintenance services eg. <ul style="list-style-type: none"> <li>• Preventive maintenance</li> <li>• Monitoring</li> <li>• Spare parts management</li> </ul>	Process delegation services (PDS) – Operational services eg. <ul style="list-style-type: none"> <li>• Managing maintenance function</li> <li>• Managing Operations</li> </ul>

		• Maintenance contracts	
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(Source: Own design – based on Ulaga & Reinartz (2010) table 3 and Oliva & Kallenberg (2003) table 1)

Even though there is a broad consensus as to what constitutes PSS, the consensus stops when it comes to measuring innovation. Here it seems that theory has settled in to opposing camps. The first camp is that of assimilation. In the Assimilation approach to service innovation the differences between the processes of innovating products and services are acknowledged, but the emphasis is put on the similarities. Within this approach it is therefore concluded that the measure for innovation in services has to assimilate to that used for products (Sirilli & Evangelista, 1998). The opposing camp represents the demarcation approach (Drejer, 2004) within this string, the consensus is that the differences are enough to warrant special measures. This position is argued by authors like Hipp and Grupp (2005) and Ettlie and Rosenthal (2011).

### Method:

At this point the analysis consists of five semi structured interviews and Danish survey data primarily from the European Manufacturing Survey, supplemented by results from the Community Innovation survey, conducted by Statistics Denmark.

All the companies participating in the interviews are Danish companies that combine physical products with service offerings. The companies were of different size and had different products, their origin were primarily in manufacturing but they all had a a priory conception of themselves as PSS suppliers. The purpose of the interviews was to investigate what the different companies perceived their PSS what role they played within the company and finally how the company handled the new 'type' of product and the development of new product / service combinations.

The survey data came from Statistics Denmark's report of the Community Innovation survey (CIS)(Månsson et al., 2013) the most recent data being from 2011 presented as preliminary results. The community Innovation survey is an elected sample of all Danish companies, when conducted by Statistics Denmark the companies selected in the sample are obliged by law to answer the questionnaire, which is reflected by the nice return rate generally around 90% (the general quality declaration for this statistic is available at [www.dst.dk/kvalitetsdeklaration/128021](http://www.dst.dk/kvalitetsdeklaration/128021)).

In supplement to the Danish National statistics from CIS, we have the European Manufacturing survey. The analysis of the paper is based on the multi-topic and multi-country European Manufacturing Survey (EMS). EMS is a European joint survey project carried out in 13 mainly European countries. The population of firms was delimited as manufacturing companies (NACE 15 to 37) with more than 20 employees. By these criteria the procedure in both 2009 and 2012 was to draw a list from Experian, all companies on the list was then contacted and asked for participation. In 2009 the original Experian list was 3035 companies, from this list 1291 companies accepted to participate ending up with a final sample of 335 companies. In 2012 the list from Experian included 2728 companies and 1010 companies were willing to participate, from these companies we derived a final sample of 204 Danish manufacturing companies.

The survey data of both surveys was at this point primarily used for a overall assessment of the reliability of the applied indicator for Service innovation.

### Reliability of the current measure:

Through the available surveys we have looked at the validity of the current constructs for measuring service innovation. Even though theory settles in two camps in regards to measuring service innovation. We should notice that in both of the two major surveys that currently tries to measure service innovation statistically in recurrent surveys, it is only the assimilation approach that is represented. The two surveys are, The Community Innovation survey (CIS) that in Denmark is conducted by Statistics Denmark, as a part of the Eurostat organization, and the European Manufacturing Survey (EMS), that in Denmark is carried out by University of Southern Denmark, as part of a European partnership lead by the Fraunhofer ISI. In both of these surveys the service innovation is measured with the question *“Has your company introduced new or significantly improved services within the period XX to YY”* where the XX/YY period covers three years that is the maximum period recommended by OECD in the Oslo manual. The findings are reported slightly different in the two surveys. In CIS Innovation is only reported as a aggregated measure of both service and product under the heading ‘Product innovation’. Though CIS reports the distribution of Companies that are either product-innovative, service-innovative or innovative in both areas innovative, the relevant outcome variables that are measuring the ‘success’ of innovation are only measured on an aggregated level and therefore won’t be able to show a positive outcome of service innovation on its own.

The force of the current measure is of course the apparent validity; CIS shows a very stable measure that since 2008 has had monitored Product innovation (including services) around 20 % of companies. And also the distribution of service Innovative companies has been relatively constant within the group of innovative firms with 21% in 2009 and 22% in 2010 and 2011 (Månsson et al., 2013). Also in the EMS the measure of service innovation seem constant, at this point the survey has been conducted 2 times and both times the share of service innovative firms has been around 20%, a preliminary investigation shows that this seem to be general for most of the European partners. Another interesting fact shown by the EMS is that around 85% of the manufacturing companies are service providers, as they offer at least one of eight specific services asked for in the EMS. In The CIS the measured outcome variable ‘\*turnover’ is not measured for services alone, and it is therefore not possible to assess how much service innovation is able to generate with regard to outcome measured as profit. In the EMS the 2012 survey contained a question on how much of the service that the company had directly invoiced to their customers and how much was indirectly invoiced via product prices. The Pilot testing of the questionnaire did not indicate any problems with respect to reporting these figures by the respondents. But the preliminary analysis of the collected data has shown some difficulties resulting in a high degree of missing’s.

With the overall stability of the answers to the current questions on service innovation, “Have your company introduced new services within the last three years “ is concluded to be a reliable measure.

### Validity of the current measure:

The apparent reliability of the measure of service innovation has to be matched by an equally high validity too, if we should argue that we have a strong measure. And it is here that the preliminary interviews that we have done so far points to problems in what is actually measured.

As already mentioned the qualitative analysis at this point consists of five Semi structured interviews with different Danish companies offering PSS to their customers.

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The findings points to huge differences in the different companies internal perceptions first of what is considered service, second to how close the tie between the product and service offering is. Finally how the company handles the development of new PSS offerings.

The companies in general agree that they provide PSS, and that the PSS constitutes an entity that is more than the physical product. What is in reality the content of the PSS vary very much between the five different companies.

One company states that service to them is the added sale of a service contract that includes annual, biannual or even 4 visits a year to the customer for servicing the physical product they have bought. Though the manager at this company is happy that they are able to sell these contract as they in his eyes are very profitable, he can't help to think that the fact that the company's products are now better serviced than before costs something in the sales department. As the machines don't break down to be replaced as often as they used to. In this company's perception the tie between the product and the service is very loose, and if the customer wants it the product can off course be bought without the service contract, but as the manager explains, the customer would be made aware of the fact that they will have a lower priority if the bought product eventually breaks down.

In opposition to this a manager in another company explains how they have adapted a project view of their sales, offering themselves as turnkey deliverers of larger facilities for their customers, in which they are involved all the way from the first project planning to the final hand over of the functioning equipment. This company has after working for several years as turnkey deliverer which includes a significant service component also started to operate as facility managers in this respect the product /service tie gets as close as possible, as the customer no longer purchase the product for its capabilities to produce a specific thing, but rather buy the production of the machine that they own, more or less substituting the price of the original equipment with a price of the produced goods of this equipment.

Another interesting difference is seen in how the companies handle the PSS internally, reflected in how the companies handle the ideas for new PSS. Most of the companies see the potential for generating ideas in the production process, which in the case of services is done in some form of collaboration with the customer, as theory tells us it should be. But how the companies perceive the meaning content vary very much. One company only sees the ideas stemming from e.g. service technician's contact with employees from the customers company as, at best, leads for the sales department to react upon. As the manager says, the employees that our technicians meet are usually so low in the hierarchy of the customer company and as such not able to make any major purchase decisions. Another company is much more aware of the fact that ideas for new PSS can come from the contact that the companies frontline personnel e.g. Field technicians, and even though the technicians are also supposed to bring Leads on to the sales department, it is clear that the development of new PSS is highly dependent on the input from the 'front line' personnel.

A final point that is raised by the interviews points to yet another trait of the company's focus on PSS. Even though they all feel that they are developing new services to introduce new PSS. The identification of 'new' or 'significantly improved' is hard especially with regard to new services. In agreement with the theory in the area they the companies seem to have some difficulties when they have to point to new services. The Interviews have been made recently and most of the companies mention that their customers have had a keen focus on the costs of service, which have led to changes, but even with this knowledge they do not

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see the changed services with reduced costs for the customers as new. It does seem though that the companies are very aware of how the margins made in the service area, as such it could be that there is an possible indicator for service development and innovation in a measure of service level development, both with respect to what is included in the service offerings, but also how the companies sees the development in the volume of service sold as part of PSS.

With regard to the validity of the current service innovation measure, it seems more questionable, whether we can claim the measure to be valid. It is obvious that the meaning that the respondents in our interviews put into the concept is very different. It also seems that how the companies handle the innovation in this area, this could indicate for further investigation. That we need to get a clearer picture of what service means in different companies. So even though companies are able to answer to whether they have introduced new services, the content of this answer can vary, thus indicating a less valid measure.

### **The future:**

The analysis shows that the current measure apparently is reliable and stable, at the same time that we cannot be 100% sure of the validity of the measure.

The findings open for a discussion, of what could be more valid measures of service innovation.

One important point from the analysis is that even though the differences are recognized comes from the fact the interviews shows that even though the companies all consider themselves active within the discipline of offering PSS the real content of what is considered service varies.

A first answer could be the one already adapted in current practice, which is to adhere to the assimilation approach argued by Sirilli (Sirilli & Evangelista, 1998), with this approach we can apparently uphold the existing valid measure, but we have to consider that the problems in validity can lead to a shift. Statistics Denmark has chosen to counter this risk by exchanging their respondents with a rolling exchange, changing only half of the companies in the selected sample every year.

The other theoretical possibility, was the demarcation approach, that acknowledges that services is innovated in ways, so different from product innovation processes that it warrants a special measure this position was argued by authors like Hipp and Grupp and Ettl and Rosenthal (Ettl & Rosenthal, 2011; Hipp & Grupp, 2005). In our findings it seems that the problems in the validity of the current measure, that at the very least indicates that the process cannot be measured in a way equal to that of product innovation, but perhaps even indicating the need for a measure that varies across industrial sectors, making the meaning content of the term service more equal among the respondents to a given survey question.

One option to make this possible, even though it is hard to counter this in a statistical survey, could be to implement a battery of services offered, which besides interesting background information could function as a frame of mind for the following service innovation questions. The inclusion of a framing block to clarify what could be considered service will be a larger change in the CIS than the EMS where the framing block is already used. I still propose to expand the block of questions on services offered from the current 8 services to a more comprehensive block based perhaps on the framework presented by Tan et. Al (Tan, Matzen, McAloone, & Evans, 2010), this could give a frame of mind for the respondents. Another advantage of a

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expanded block of questions on services offered could be the ability to explore whether certain specific combinations of service offering are more relevant within certain business areas. Though it seem so intuitively, it is at this point hard to establish from the current block of 8 services included in the EMS survey. The expansion of the block of services offered could perhaps make the differences in the combinations of services visible and maybe allow for identification of certain industry specific 'optimal' service combinations.

The Interviews also shows that one of the distinctive traits of an active service innovation is the ability of the company to capture ideas for new services. This ability could be an indicator of service innovation, because the contact between customer and service provider, in most cases happens far away from company management, both organizational and physically. And as such the ability to move ideas for new service developments up and into the company to be developed into new or changed services, could be an indication of the company's will to develop services in general.

Finally a unexplored path, also presents itself for investigation. The preliminary interviews done this far really show one trait that is common to all the companies. That is the development in the importance attributed to service both in how much service is offered and thereby, it could be that an reliable measure could be established through measuring developments in the company's service levels.

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