Servitization in Engineer-To-Order companies: evidences from a multiple case study research
Federico Adrodegari¹, Andrea Alghisi¹, Andrea Bacchetti¹

¹Dept of Mechanical and Industrial Engineering, University of Brescia,
Via Branze, 38 – 25123 Brescia, Italy
federico.adrodegari@ing.unibs.it
a.alghisi@uni.csmt.it
andrea.bacchetti@ing.unibs.it

Abstract
Nowadays, services are increasingly taking the lead in global economy, in terms of both wealth produced and value added (Wölfl, 2005); at the same time the economic downturn has led in the last years, to demand stagnation on European markets. Thus, services, that are much more difficult to imitate by being less visible and more labor dependent, are becoming a sustainable sources of competitive advantage. Several evidences from OM literature show that in capital goods manufacturing context, extending service business through what has been defined “servitization” (Vandermerwe and Rada, 1988), can lead to generate new additional revenues and profits (Oliva and Kallenberg, 2003; Brax, 2005, Neely, 2009; Baines et al., 2009). Given this context and the relevance of the machinery industry (a typical Engineer-To-Order context) in the Italian economy, we investigate through an empirical research the state-of-art of this servitization process. The main objective of our study is to identify lines of improvement that ETO companies can follow to better exploit the service potential. Preliminary results highlight that, although companies perceive the increasing importance of services, they have not tackled yet the real challenges of servitization: strategy and culture are still focused mainly on tangible product and service portfolio is underdeveloped. Moreover, there is a lack concerning the management of service, both in terms of methodology and ICT support systems. Therefore, a more structured approach to the servitization process may ease companies in optimizing service delivery and gaining (real) competitive advantages.

Keywords: Servitization, Engineer-To-Order, Machinery, Multiple case study.

1. Introduction
Nowadays, services are increasingly taking the lead in global economy, in terms of both wealth produced and value added (Wölfl, 2005). Also for many manufacturing companies servicing products is an increasing part of their business: they have realized that services can generate profits in short-term and provide a competitive advantage in long-term (Corti and Mills, 2007). Moreover, services, by being less visible and more labour dependent, are much more difficult to imitate, thus becoming a sustainable sources of competitive advantage (Heskett and Sasser, 2010). Despite these potential, the list of manufacturing organizations, with strong service strategies is not as long as the literature would predict (Oliva and Kallenberg, 2003): services have been traditionally deemed as a necessary evil in the context of marketing strategies (Mathieu, 2001). Furthermore preliminary results of our study highlight that, although companies in this industry perceive the increasing importance of services for their business, they haven’t still tackled the challenges of “servitization”: strategy and culture is still focused mainly on tangible product, service portfolio is generally underdeveloped and new service development process isn’t formalized. The servitization process involves also a radical shift in the way people and companies produce and use goods and thus it is affecting all the main industries, and especially manufacturing.
This complex situation, along with the relevance of the machinery sector in the Italian economy, suggested us to better understand the state-of-art of servitization process and the perceived importance of services in this sector.
Due to the exploratory intent of this study, we based our work on a multiple case studies empirical research (see for example Sousa and Voss, 2001), aiming at answering the following research questions:
• RQ1. How is perceived the service business in the Italian machinery industry and which are the opportunities to exploit?
• RQ2. Which is the service orientation level of Italian machinery companies?
  o RQ2a. Which is the relationship between service strategy and service offering?
  o RQ2b. Which is the relationship between service strategy and the adoption of ICT systems to support service design and delivery?
  o RQ2c. Which is the relationship between service strategy and firms economics?

The paper structure is therefore the following. In section two a brief analysis of the main features of Engineer-To-Order (ETO) environment and servitization is carried out, in order to obtain a picture of the industry analysed in our empirical research. The objectives and the adopted methodology are depicted in section three, while section four describes the main findings based on case studies research. In the same section, the findings are discussed in order to point out the main messages coming out from the study; conclusive remarks and directions for future research are drawn in section five.

2. Servitization in the (Italian) ETO machinery industry

Italian machinery industry is a relevant sector (Italy is the fourth producers of machine tools in the world after China, Japan and Germany), mainly composed of small and medium enterprises (the 68,4% of companies had a turnover less than 12,5 million € in 2009 and the 73,5% have less than 100 employees) that have to compete at international level, where the rules of the competitiveness have overcome the traditional boundaries of physical transactions in favour of the new digital and inter-connected economies (UCIMU, 2010).

Nowadays, economic downturn has led to demand stagnation on European markets, in particular on Italian ones. As a direct effect, Italian capital goods manufacturers export up to 70% of their production (Federmacchine, 2011). Moreover, due to globalization effects, competitive pressures generated by manufacturers of low-wage country (e.g. China) have forced product margins to decrease (Gebauer et al., 2005). This increasingly competitive intensity makes product-based competitive advantage difficult to maintain (Mathieu, 2001): according to Gebauer et al. (2010) this external environment of capital goods manufacturers, represent one of the factors that should lead to servitization.

In fact, to differentiate themselves from their competitors, manufacturing firms have begun to extend their range of service offerings and enhance their customer orientation. Companies seem to consider the extension of service business an adequate response to this challenge (Malleret, 2006). Despite the fact that services have been traditionally deemed as a necessary evil in this context (Mathieu, 2001), firms in various industries are finding that they can no longer succeed just by offering excellent products, traditional after-sales service and logistics (Kowalkowski et al., 2013).

There are also many evidences from Operations Management literature that show that extending the service business through what has been defined as servitization (Vandermerwe and Rada, 1988), can lead to generate new, less imitable, competitive advantages and new additional revenues and profits (Wise and Baumgartner, 1999; Goffin and New, 2001; Oliva and Kallenberg, 2003; Brax, 2005, Neely, 2009; Baines et al., 2009).

In particular, for capital equipment manufacturers due to the characteristic of products (long equipment life cycle, high total cost of ownership for the end user and expensive downtime) after sales services have always been an important part of their business (Corti and Mills, 2007).

Therefore, also in Engineer-To-Order companies, there is an increasing interest in adding value through the provision of services that extend the spectrum of their products and improve customers’ satisfaction and loyalty. ETO companies deliver products engineered (or optionally re-engineered) according to the specific requirements of a customer (Hameri, 1997)
and this leads to a more dynamic and uncertain environment (Hicks et al., 2000). The main characteristics of the ETO paradigm could be summarized as follows: decoupling point located at design stage, complexity, high level of customization, low volume, long life-cycle, change in requirements and long lead times. In order to guarantee availability of their complex machines and high productivity levels, a structured organization of service development and delivering processes along with an integrated Information and Communications Technology (ICT) support may become key factors for ETO companies to successfully deal with the new economic scenario.

Even though this description matches the rationales that according to Wise and Baumgartner (1999) should lead manufacturers to extend their service business, only recently manufacturers have considered services from a strategic perspective: services can support not only the product but also customers and their processes. Therefore, in recent years, increasing number of manufacturing firms are reorienting their value propositions from selling products to provide solutions, trying to offer integrated solutions encompassing services and products as a way to overcome the commoditization of products, declining profitability and customers with increasingly complex needs, manufacturers of capital goods (Gebauer et al, 2013).

Starting from the importance of the servitization process in literature and the related opportunities for capital goods manufacturers, we investigated the state of art of servitization of Italian capital equipment manufacturers that respond to customers demand through Engineer-To-Order strategy.

We postulate that a formalized service process could represent a great opportunity for this kind of companies in order to increase revenues during the whole product life-cycle, reaching high profitability, picking-up information and feedback from customer and, last but not least, gaining competitive advantage against worldwide competitors.

For this reason, a more detailed analysis of Servitization process in ETO Italian machinery sector, along with supporting ICT tools, has been carried out and described in section 4.

3. Objectives and methodology

According to the research questions defined in the previous section, the main aims of this paper are the following:

- to investigate the attractiveness and the importance of the servitization process perceived by ETO companies, both in terms of achieving competitive advantage and increasing profits (RQ1);
- to analyse the organizational nature of the service strategic business unit (RQ2a);
- to analyse the nature of service portfolio (RQ2a);
- to highlight strengths and weaknesses of the service business processes evaluating their ICT requirements and support level (RQ2b);
- to investigate the relevant service-related economics dimensions (RQ2c).

The findings presented in the remainder of the paper (Section 4) are based on a multiple case studies empirical research, a form of qualitative-descriptive research that refers to the collection and presentation of detailed information about a group of companies, drawing conclusions about that group in a specific context. Multiple cases also enable broader exploration of research questions and theoretical elaboration and because case numbers are typically small, a few additional cases can significantly affect the quality of the research (Eisenhardt and Graebner, 2007).

Due to the nature of the research questions and to the exploratory intent of the research, in order to achieve the objectives presented above, we carried out 9 case studies in companies operating in the ETO machinery sector. In fact, as reported by Voss et al. (2002) and Meredith (1998), case study allows the investigation of the phenomenon of interests in its
natural setting (i.e. through the observation of actual practice). Thus, case studies allow for a richer knowledge of issues associated with the management choices than would have been possible through a quantitative approach (Nordin, 2005). Finally, as pointed out by Voss et al. (2002), the case method lends itself to early, exploratory investigations where the variables are still unknown, such as in this study.

If multiple case studies are to be used for research, then a vital question is the case selection: the traditional way of sampling is to identify a population, and then to select a random or stratified sample from that population (Voss et al., 2002). However, in case research it is not possible to build a sample of cases by selecting cases according to different criteria (Eisenhardt, 1989; Yin, 2009). Therefore, we start to select companies adopting the judgemental sampling technique in which sample is based on the researchers’ experience, knowledge of the sector and available data. The sample includes ETO companies that owns observable traits that are key factors in our research questions includes and that as reach a certain peaks of excellence in various specific industries (from CNC machine centre to automatic assembly line design and manufacturing) and are heterogeneous in terms of dimension.

The selected companies are briefly described in Table 1.

<table>
<thead>
<tr>
<th>Case Name</th>
<th>Turnover 2011 th EUR</th>
<th>Employees 2011</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>€ 66.176</td>
<td>222</td>
<td>Company A is the world leader in the production of printing machines designed for packaging applications</td>
</tr>
<tr>
<td>B</td>
<td>€ 39.492</td>
<td>198</td>
<td>Company B is specialized in designing and manufacturing machining centres, flexible production systems and ad-hoc solutions for various applications</td>
</tr>
<tr>
<td>C</td>
<td>€ 6.019</td>
<td>42</td>
<td>Company C design, produce and commission industrial automation systems for the management of process automation of the iron and steel industry</td>
</tr>
<tr>
<td>D</td>
<td>€ 5.968</td>
<td>55</td>
<td>Company D designs and manufactures industrial machines (i.e. multicentre and transfer)</td>
</tr>
<tr>
<td>E</td>
<td>€ 6.221</td>
<td>53</td>
<td>Company E studies, designs and builds machines and modules for the automation of assembly processes</td>
</tr>
<tr>
<td>F</td>
<td>€ 12.074</td>
<td>76</td>
<td>Company F designs, produces and assists solutions that help industries worldwide achieve consistent product quality</td>
</tr>
<tr>
<td>G</td>
<td>€ 5.377</td>
<td>40</td>
<td>Company G designs, produces and assists trimming machines</td>
</tr>
<tr>
<td>H</td>
<td>€ 5.979</td>
<td>29</td>
<td>Company H delivers a variety of solutions in the field of measuring instruments and testing benches</td>
</tr>
<tr>
<td>I</td>
<td>€ 28.595</td>
<td>79</td>
<td>Company I designs, manufactures, sells and supports plate bending rolls</td>
</tr>
</tbody>
</table>

| Average   | € 19.544             | 88             |

Table 1 – Sample demographics (taken from Bureau van Dijk AIDA database).

A well-designed protocol is particularly important in multiple case research (McCutcheon and Meredith, 1993); also Yin (2009) recommended the use of a case-study protocol as part of a carefully designed research project. Following other studies in the ETO sector, our adapted research protocol is summarized in “Figure 1”.

4
As presented in the protocol, different instruments were used, including semi-structured interview, direct (field) observations and a structured database in order to collect and store the information after each interview. During the semi-structured interview, to explore the research proposition, we used the “Service Questionnaire”, that includes the topics to be covered during the interview, the questions to be asked and indicates the specific data required. This questionnaire was tested by several business professors of our department (appropriate changes were made) and served both as a prompt for the interview and a checklist to make sure that all aspects have been covered.

The interviews, that were directed to specific key respondent within each companies (entrepreneur, CIO and Service Manager), started with broad and open-ended questions first, in which respondent were inquired about the Service organization and, as the interview progresses, the questions become more specific. In this phase, in order to better investigate the nature of service portfolio, we submit to respondents a detailed list of 41 services (divided in 14 categories, listed in Table 5), developed starting from literature (see in particular Oliva and Kallenberg 2003; Corti and Mills, 2007; Neely, 2009) and enriched with contribution derived from best practices.

According to the objectives of the study, the “Service Questionnaire” was organized in four main sections, as Table 2 shows:

<table>
<thead>
<tr>
<th>Section (constructs)</th>
<th>Variables</th>
<th>References</th>
</tr>
</thead>
</table>
| Service business attractiveness | -Respondent perception of services' contribution to the firm competitive advantage  
<p>|                             | -Respondent perception of services' contribution to the firm profit         | Dimensions of service classification taken from Mathieu 2001; Oliva and Kallenberg 2003; Corti and Mills 2007; Gebauer et al. 2008; Neely 2009; Eggert et al. 2011 |
| Service strategy           | -Nature and clearness of Service SBU                                      | -Variables taken from Oliva and Kallenberg 2003; Oliva et al., 2012.                                   |
| Service offering           | -Number of service offered                                                | -Dimensions of service classification taken from Mathieu 2001; Oliva and Kallenberg 2003; Corti and Mills 2007; Gebauer et al. 2008; Neely 2009; Eggert et al., 2011. |
| ICT support                | -Typologies of information systems (IS) adopted to support the activities  | Variables elaborated from Agnihothri et al., 2002; Lehtonen and Ala-Risku 2005; Ala-Risku               |</p>
<table>
<thead>
<tr>
<th>Section (constructs)</th>
<th>Variables of the Service SBU and service delivery processes</th>
<th>References 2009; Brax and Jonsson 2009; Colen and Lambrecht 2013.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Respondent perception of the importance of IS to support service activities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2 – Constructs and variables investigated through the Questionnaire**

<table>
<thead>
<tr>
<th>Economics</th>
<th>- Installed base volumes</th>
<th>- Ratio of installed units to annual new-unit sales</th>
<th>- Percentage of turnover gained from services</th>
<th>- Services marginality</th>
<th>Variables taken from Wise and Baumgartner 1999; Oliva and Kallenberg 2003; Fang et al., 2008; Neely 2009.</th>
</tr>
</thead>
</table>

The data collected through the interviews allowed to perform some cross-case analysis related to the investigated issues and are reported in the next section.

### 4. Main findings and discussion

The four dimensions (constructs) pointed out in Table 2 are used to categorize the case findings, following the hereafter-depicted research blueprint.

![Figure 2 – The research blueprint](image)

**4.1 Service business attractiveness**

By comparing service portfolio of studied companies with the perception of attractiveness of different typologies of service, opportunities in terms of both achieving competitive advantage and increasing profits have emerged. Manufacturers can pursue these opportunities by enhancing specific typologies of services offered. In particular, according to companies perception of the role of services in their markets and looking at their actual service portfolio,
in order to improve their competitive position, ETO companies may develop and deliver more services aimed at support customers and their processes in the pre-sales phase (e.g. co-design services, analysis of customers processes, etc.) and in the after-sales phase (e.g. e-learning, suggestions on how to improve the equipment efficiency, etc.). Moreover, offering this kind of advanced services in the after-sales phase could also lead ETO companies, again according to their perceptions, to gain higher profits. However, from interviews has emerged how, although advanced services (such as remote monitoring) have been developed years ago, customers don’t perceived them as value adding and therefore are not willing to pay for them.

4.2 Service strategy
In order to investigate the existence of relationships among some of the variables related to the service strategy that are taken into account in the present study (see Table 2 for details), we clustered the sample on the basis of variables concerning with the nature and clearness of service strategic business unit and according to theory we measured orientation of manufacturers to service.
In particular, we attributed a grade to responses given by companies on each of the variables represented in Table 3, using a relative comparison as suggested by Sousa and Voss (2001). Thus, as prescribed by Voss et al. (2002) we summed up score of single variables obtaining an overall value that we used to rank the cases. Starting from the values that we obtained, using one of the data analysis techniques describe in Miles and Huberman’s (1994), we clustered our sample. In fact, from an organizational standpoint, according to the existent literature that we used to select variables and measurement unit (see Table 2 for details), companies with an higher overall score (cluster one) are actuating the most formalized service strategy among the studied companies, while companies with lowest score (cluster three) the less formalized.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Case Name</th>
<th>Person in charge of services</th>
<th>The service function is</th>
<th>Service Strategic Business Unit (SBU)</th>
<th>Service SBU established</th>
<th>Service SBU nature</th>
<th># of services formalized with procedures</th>
<th>KPI dashboard concerning Service SBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>Present</td>
<td>Formalized</td>
<td>Present</td>
<td>More than 10 years ago</td>
<td>Profit centre</td>
<td>All</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Present</td>
<td>Formalized</td>
<td>Present</td>
<td>More than 5 years ago</td>
<td>Profit centre</td>
<td>All</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>Present</td>
<td>Formalized</td>
<td>Less than 5 years ago</td>
<td>Cost centre</td>
<td>All</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>Present</td>
<td>Formalized</td>
<td>Less than 5 years ago</td>
<td>Profit centre</td>
<td>All</td>
<td>Not present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Present</td>
<td>Formalized</td>
<td>Less than 5 years ago</td>
<td>Profit centre</td>
<td>Some</td>
<td>Not present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>Present</td>
<td>Not completely formalized</td>
<td>More than 5 years ago</td>
<td>Profit centre</td>
<td>Some</td>
<td>Not present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Present</td>
<td>Not completely formalized</td>
<td>Less than 5 years ago</td>
<td>Profit centre</td>
<td>None</td>
<td>Not present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Present</td>
<td>Not completely formalized</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>Some</td>
<td>Not present</td>
</tr>
</tbody>
</table>
Table 3 – Companies organizational characteristics and cluster composition

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Case Name</th>
<th>Person in charge of services</th>
<th>The service function is</th>
<th>Service Strategic Business Unit (SBU)</th>
<th>Service SBU established</th>
<th>Service SBU nature</th>
<th># of services formalized with procedures</th>
<th>KPI dashboard concerning Service SBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Present</td>
<td>Not Formalized</td>
<td>Not present</td>
<td>Not present</td>
<td>Not present</td>
<td>None</td>
<td>Not present</td>
<td>Not present</td>
</tr>
</tbody>
</table>

As shown in Table 3, all case companies contemplate a person in charge of services delivery, however, only companies in cluster one and two have formalized an organizational function responsible for development and delivery of services. Going further in the analysis of the level of formalization of the service organization, companies that implement a formalized Strategic Business Unit (SBU) for the management of service size down to five. Moreover, the majority of these Service SBUs have been established only recently, on average less than five years ago. In terms of accounting nature of the Service SBU, almost all the studied companies seems to have made one of the most important step of the servitization process, structuring it as a profit centre. Focusing on the service delivery, only four of the studied companies formalized all of their services using structured procedures. Finally, companies that implement a specific KPI’s dashboard in order to monitor and control the performance of the Service SBU, that according to theory is another key issue in the servitization journey, are only three out of nine, and none of them consider the adopted dashboard fulfilling their needs.

4.2.1 Service offering

Using the above-explained clusters we further analysed the nature of service portfolio considering both the number and the typologies of services offered. In terms of number of services there seems to be no relationships with the level of formalization of the service organization. In fact, companies in cluster three offer on average the same number of services of companies in cluster two. However, looking at the different typologies of services offered, interesting differences among clusters emerge. In particular, companies in cluster one compared to other clusters offer a wider number of services aimed to support the customer and the product functioning both during the sales and the after-sales phase of the product life-cycle. Vice versa, services supporting customer processes both in the pre-sales and in the after-sales phase are offered homogeneously by cluster one and three. From these results we drew the following conclusions:

- high formalization of service organization is positively related with the offerings of services that aim to support the product functioning and the customer itself both during the sales and the after-sales phase of the product life-cycle;
- high formalization of service organization is not a prerequisite to offer services that aim to support customers processes in the pre-sales and after-sales phase of the product life-cycle.

Shifting the focus to the different categories of service that can be offered, emerges that some of them are not differential among cluster.

That is the case of standard and consolidated services such as documentation, training, maintenance, spare parts, etc. While typologies of services that implies higher risks for the manufacturer that decide to provide them, such as the pay-per-use and warranty extensions, are more frequently offered by companies in cluster one. Vice versa, typologies of services that deal with co-design of the machines, financing, customers’ processes optimization and asset remote monitoring are equally offered by companies of cluster one and three. Again, from these results we drew the following conclusions:

- high formalization of service organization is positively related with the offerings of
services which imply higher risks for the capital equipment manufacturers;

- high formalization of service organization is not a prerequisite to offer services strongly related with technological capabilities and capital equipment manufacturer’s core competencies.

4.2.2 ICT support
Results of present research confirm the perceived lack in the management of service processes: although in recent year the use of integrated information systems (IS) has grown, we observed a limited ICT support and a low level of satisfaction of companies. Studied companies consider ERP systems inappropriate to manage and support services and related information flows. In fact, the only company that has used it as main system decided to switch to a specific – though still ERP integrated - solution a couple of years ago.

Analysing in detail which IS companies implement to support each of their services, the ERP emerges as the widely adopted solution only for managing demand and provision of spare parts, services that are offered by companies from many years. Vice versa services such as machine installation and start-up, technical assistance (routine mechanical and electrical interventions), ticketing, training and machine efficiency advice are more often supported by ERP integrated specific IS such as CRM and PLM.

Although clear relationship between formalization level of the service organization and the adoption of advanced IS doesn’t emerge from our analysis, companies with a higher formalization of service organization (cluster one and two) are supported by more specific and integrated ISs and perceived the IS supporting service activities and processes as more important than companies without a formalized service organization.

These results led to conclude that: in order to manage and support service organization, service delivery processes and related flow of data/information, specialized and integrated solution such as CRM or PLM systems should be implemented.

4.2.3 Economics
Coherently with servitization theory, from case studies emerges that companies with a more formalized service organization manage a wider installed base. As done previously, we drew the following proposition, also in ETO machinery sector: wide installed base are related with high formalization of service organization.

Another evidence emerged from our analysis is that, installed base of companies with a more formalized service organization have grown slower than other companies in the last three years.
This phenomenon can be viewed either as a cause or as a consequence of the development of a service strategy. The former happens when due to demand stagnation or strong market competition, manufacturers decide to increase their investment in the development and provision of services. Conversely, the latter happens when, due to a specific input from the firm’s decisional apex, a strong service strategy is put in place. In this case, the shift of investment from product to service could lead to diminishing the product sold in favour of services.

5. Conclusion
Our paper aims to build up the basis to extend the theory of servitization in a specific context such as the (Italian) machinery sector.
Summarizing findings described in the previous section:

- Through the analysis of services perceived importance, we identified which are the typologies of services that a manufacturer in the ETO machinery sector should provide in order to increase competitive advantage and profits (e.g. services aimed at support customers and their processes both in the pre-sales and after-sales product life-cycle
phase). In particular:
  o ETO companies are still offering traditional (support) services oriented to increase product availability and reduce lifecycle costs, and are based on condition-based maintenance and on spare parts management activities.
  o There is a lack in the offering of advanced services, in line with the new business template, leveraging on the product ownership retained by the manufacturer and the identification of customer needs, moving towards a “solution oriented” perspective.

- Analysing the nature of service organization and service portfolio emerge that provision of some service typologies with specific characteristics such as services aimed to support the product functioning and the customer both during the sales and after-sales product life-cycle phase, seems to be positively related with the formalization level of service organization while others typologies are not.
- Analysing ICT and IS functionalities emerge that advanced services suffer a lack of support and that ERP systems are not suited for these kind of services.
- Finally, analysing firms economics, emerge a potential linkages between variables such as the installed base dimension and the service strategy.

Specific area of future research could be the following:
  • How IS support different typologies of services, in order to establish a set of evaluation criteria that would help manufacturers in the decision of implementation of specific IS aimed at ease service management.
  • Investigation of specific casual relationship between variables such as the installed base dimension and service organization formalization level.

Further research should also aim to clarify the direction and intensity of the relationship between development of a service strategy and economics variables.

6. References


