

PRODUCT-SERVICE SYSTEMS IN A MANUFACTURING COMPANY STRATEGY - A REVIEW PAPER



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JUSTYNA KOZŁOWSKA

ABSTRACT

Fierce competition among entrepreneurs, the process of global economy servicization and increasing customer demands force manufacturers to introduce new business models and new solutions such as Product-Service Systems (PSS). In this paper, the Product-Service Systems concept is reviewed, on the basis of the latest academic literature. The classification of PSS types is also presented. Benefits that accrue from systems of integrated products and services implementation, as well as barriers and challenges that a manufacturing company faces in this process, are indicated. The successfully applied Product-Service Systems in industrial sector firms at global market are also presented. The author made a review of research that have been conducted in recent years in many academic institutes worldwide.

KEY WORDS

Product-Service Systems, Industrial Product-Service Systems, integration of products and services, manufacturing industry, servicization

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Corresponding author:

Justyna Kozłowska

Białystok University of Technology
Faculty of Management

e-mail: j.kozlowska@pb.edu.pl

INTRODUCTION

Fierce competition among entrepreneurs, along with changes occurring in the global economy (the shift into servicization of the economy or Functional Economy) and increasing customer demands force manufacturers to introduce new solutions into their

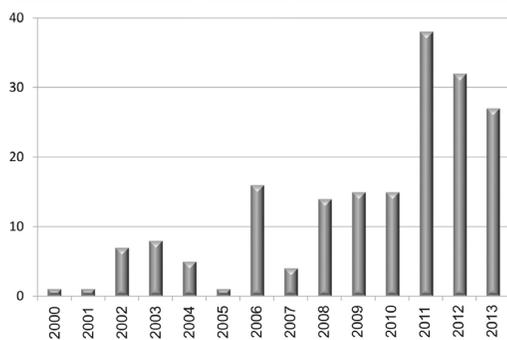


Fig. 1. Number of academic journal articles with the term Product-Service System(s) in title, abstract or keywords, published between January 2000 and July 2013.

Source: (Ostaeen, 2014)

entities. Delivery of combination of services and physical products is not only a possible solution for a manufacturing company, but become a necessity in order to increase their revenues and to ensure a com-

petitive position on the market place. Product-Service Systems (PSS) is a solution that integrates intangible services and physical products into offering that deliver value in use (Baines et al., 2007). Although an idea of offering products joined with services is not a novelty (e.g. apartments' or cars' rental), first formal definition of PSS was formulated in 1999 by Mark Goedkoop, who stated that the Product-Service System is a "marketable set of products and services jointly fulfilling user's needs" (Goedkoop, 1999). Its author underscored less environmental impact of the PSS in comparison to the classic business model, which focuses only on physical product, its manufacture and sale. Academic scientists have become increasingly interested in studying different aspects of PSS in recent decades. Fig. 1 represents findings (Ostaeen, 2014) from searching the scientific databases (Emerald Insight, Elsevier Science Direct, Springer Link and Ingentaconnect) for articles published between 2000 and 2013 that contained the PSS term in the title, abstract or keywords. As it can be observed – the number has augmented considerably in last few years.

However, in many scientific publications the authors point out the lack (Meier, Roy, Selinger, 2010) or limitations (Beuren, Ferreira, Miguel, 2013) in methodological or standardized support for PSS introduction in company's strategy, therefore the subject area seems to be insufficiently explored.

In this paper the main idea of Product-Service Systems is presented, as well as the reasons for application of such a solution in a manufacturing company. The author made a review of the academic literature on the PSS and research conducted worldwide in the field in question - few examples of which are presented in the third section of the article. Finally, the case studies of successfully implemented integrated products and services are given. The relative novelty of the Product-Service Systems concept and growing importance of services in the industry business brought the author to consider this topic.

1. THE CONCEPT OF PRODUCT-SERVICE SYSTEMS

The Product-Service Systems idea has been expounded in the north of Europe in the 1990s (Beuren, Ferreira, Miguel, 2013). A shift from selling products to providing services as a trend which aims at adding value to a business (ibid.) has been observed globally in recent years. As the economy based on purchasing product has been under transformation into the economy based on the use of product, the providers of "pure physical goods" have to respond and adjust to changing market conditions. On the other hand, a "pure service" provision may become not sufficient for a society of demanding customers. Thus, integrated products' and services' offerings are much more satisfactory from the client's perspective, and also more profitable and cost-effective from provider's point of view. The first definition of a Product-Service System was formulated by Goedkoop in 1999 (cited in the previous section). Mont defines it as "a system of products, services, supporting networks and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower impact than traditional business models" (Mont, 2002). A few other definitions appeared afterwards (e.g. Baines, 2007), nevertheless more of them convey the same idea of the integration of tangible products with intangible services into system which continuously strives for

delivering value to the customer and reduces the environmental impact of economic activity at the same time. When including the PSS into business strategy, one can choose an optimal solution from different types (Tukker, 2004) categorised at the Fig. 2.

The three main categories of the PSS types, namely product-oriented, use-oriented and result-oriented services, are widely identified in many scientific pub-

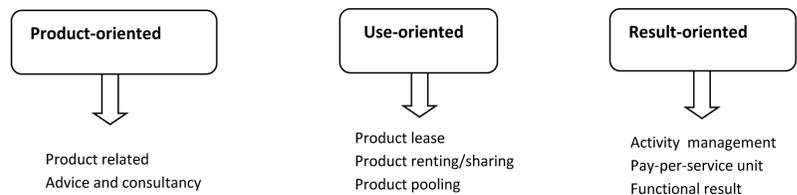


Fig. 2. Categories of Product-Service Systems

Source: (Tukker, 2004).

lications. Tukker (2004), however, proposes eight types of Product-Service Systems in the frame of these three key categories, considering different economic and environmental characteristics of each. The first category – product-oriented services – is when a business model is based on physical product's sale but some extra services are added. Here two subcategories are indicated: product related services (such as: a maintenance contract, a financing scheme or even a take-back agreement) and advice and consultancy (like: trainings in the usage of the product, advice on optimizing the logistics aspects of its usage). The next category is use-oriented services. It involves the change of a classic business model and it posits no shift of ownership. The provider holds the property of the product. In all three subcategories it is the provider who is responsible for maintenance, repair, control and disposal as well. The product lease involve the lessee payments with unlimited and individual access to the product. The product renting or sharing subcategory differs from the previous one on the access mode, which is limited and sequential (the users shift in time). Product pooling, the least popular for the moment, distinguishes from others only with a simultaneous use of the product. The last main category is a solution based on the mutual contract between the provider and the client on a result or capability and no pre-determined product is assigned. The activity management/outsourcing subtype is when an activity or its part is outsourced to the third party (e.g.: catering or cleaning offices). The pay-per-service unit subcategory embraces a number of PSS examples where the output of the product is sold on different level of use. The user pays for availability and the real-time utilization of the product. The last sub-

type of this group, namely functional result, contains the solutions applied in companies whose offerings are based on delivery of the result including abstract terms such as “pleasant climate” (instead of office furniture sale) or “minimum harvest loss” (in place of pesticides sale).

A Product-Service System can be also defined as ‘an innovation strategy, shifting the business focus from designing (and selling) physical products only, to designing (and selling) a system of products and services which are jointly capable of fulfilling specific client demands’ (Manzini, Vezoli 2003). This definition seems more useful from the manufacturer perspective. It points out the direction of the shift of activities when the application of integrated product-service solution in manufacturing company is considered. Industrial application of PSS is somewhat specific in many aspects, hence the term Industrial Product-Service Systems (IPS²) is define as “characterized by the integrated and mutually determined planning, development, provision and use of product and services shares including its immanent software components in Business-to-Business applications and represents a knowledge-intensive socio-technical system” (Meier, Roy, Selinger 2010), what means in details:

- an IPS² is an integrated product and service offering that delivers value in industrial applications
- IPS² is a new product understanding consisting of integrated product and service share
- IPS² comprises the integrated mutually determined planning, development, provision and use
- IPS² includes dynamic adoption of changing customer demands and provider abilities
- the partial substitution of product and service shares over the lifecycle is possible
- the integrated understanding leads to new customer-adjusted solutions
- IPS² enable innovative function-, availability- or result-oriented business models (ibid.).

Integration of products and services in manufacturing industry requires also the integration of manufacturer’s and client’s product lifecycle perspective, which was previously separable and the second one started in the point of the end of the first one. The manufacturer originally dealt with the product in the stages of: product design, then manufacturing, servicing and occasionally remanufacturing afterwards. From the industrial customer point of view the management of the product starts with purchasing, then product use stage and disposal at the end of its lifecycle. In the Product-Service System solution, the manufacturer supports and assists the client and take other actions by the means of intangible services provision, continuously during the other stages (that is:

purchasing, use and disposal). Therefore, the Industrial Product-Service System accounts for two subsystems (the manufacturer’s and industrial customer’s) that are related, and mutually determined and directly interactive (Fig. 3).

2. IPS² BENEFITS AND BARRIERS

On the basis of literature review and the analysis of

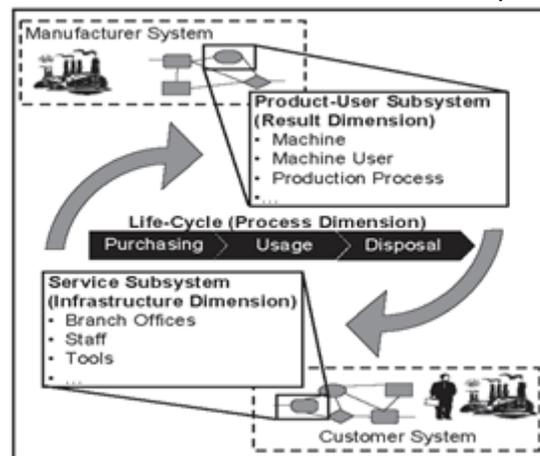


Fig. 3. Product-Service Systems in industrial application
Source: (Aurich, Schweitzer, Fuchs 2007).

examples from global market, the benefits, challenges and barriers that manufacturing company can face during the process of PSS implementation were recognized and are presented in this section.

Integrating industrial production of physical goods with service providing poses many innovative challenges for the manufacturing industry at the technological, organizational and even human level. Nonetheless, in a result, an implementation of the Product-Service System brings substantial benefits for the manufacturing company, such as:

- competitiveness enhancement – the PSS introduction is a new source of competitiveness, which is difficult to obtain and copy in a short time; the manufacturer may leave the price competition and shift from leadership in technology to leadership in utilization,
- reduction of production costs – e.g. through reuse of parts from the products that reached its end of life and optimal use of materials (likewise knowledge and/or technology) in a production process,
- new means of exploitation of knowledge and human resources,
- increase of productivity – through the savings made on costs’ reduction and new source of incomes based on the use of the product during the all lifecycle,

- higher customer loyalty and satisfaction – due to stronger, more frequent and/or continuous contacts with the client, deeper and more intense relationships are established,
- accessibility to product thorough all lifecycle – which provide information about the product at all stages of its lifecycle and thereby enhance its innovation potential,
- easier recycling management – by the accessibility to the product and possibility to forecast and plan the recycling process.

The nature of profits are therefore economic, ecological and social as well. The sustainability issues can also arrive. Less environment impact can be obtain through: reduction in consumption by alternative of product use, reducing waste by the prolonging of the product lifecycle and refurbishment, reuse of materials disassembled from products that achieved the end of life and responsible recycling. From the customer point of view, integrated product-service offerings guarantee the continuous satisfaction, contain a flexible and personalized service and ensure quality advantages in products and services (Beuren, Ferreira, Miguel 2013).

However, as mentioned above, the shift from manufacturing products into delivering a product-service mix is relatively demanding and involves a lot of challenges and tasks to be accomplished. Several, but certainly not all of them, are listed below:

- risk assessment – complexity and unpredictability of costs along with uncertainty involved in the IPS2 and difficulties in identification of all risks sources influence the assessment process,
- cost and productivity analysis –all costs at various stages of product lifecycle (design, delivery, adaptation) have to be considered, and, additionally, services costs that include hidden values (such as: relationship management costs, communication costs, costs of reverse logistic etc.) are somewhat problematic in identification, measurement and assessment,
- cost forecasting – if cost analysis causes difficulties, the forecasting is thereby harder and more complicated to proceed,
- system approach – the integration of products and services requires the change of company approach from “product thinking” into “system thinking”;
- planning and designing of integrated products and services –not only do different methods and tools should be applied (whereas still in practice product design methods are used only) but also both design processes should complement each other and take place simultaneously,
- product Lifecycle Management – the manufacturer have to deal with the product and service

through their all lifecycle, from planning and designing to the recycling or disposal,

- new business model application – the business model should be carefully chosen on the basis of in-depth analysis of company capabilities, product features and customers’ expectations,
- customer relationship management – the relationships with clients achieve an extended and higher level than in traditional product-focused business models, therefore their management poses an additional challenge for organization,
- information management – in IPS2 the information system has to integrate the management of product and service information as well as client’s database information.

Thus, the process of product-service integration engages employees of different departments and specialist of different fields such as: service designers, product designers, analysts, production engineers, managers and economists, marketing experts. The Product-Service System implementation is then a multidisciplinary undertaking.

Analysis of these challenges reveals the main barriers that the manufacturer willing to introduce PSS into the company strategy may encounter. The first obstacle is that development, design and implementation of product-service systems are time- and cost-consuming. The risk involved is complex and difficult to assess. Industry companies are not experienced in service provision, therefore they usually need new specialized employees, both for the IPS2 preparation and delivery phase. Also the lack of experience in planning and designing integrated products and services instead of physical good account for a major barrier. However, one of the most impassable obstacle is organizational and structural change that follows employment of the new business model. It is noteworthy that the customers attitude to change may also become a problem, as they may not be excited about the new solution or not ready yet to resign from the product ownership and thereby cause a failure of the PSS implementation.

3. EXAMPLES OF RESEARCH CONDUCTED ON PSS

Academic and business interest in integration of services with products in a system has been increasing since recently. The number of publication has risen over ten times in last few years especially (Ostaeyen, 2014; Bauren, Ferreira, Miguel, 2013). The articles embrace the wide range of topics related to the PSS, from aspects like: PSS definitions, design of

PSS, methods for cost analysis and factors of failure, through the sustainability and environment impact of PSS, ending with engineering aspects of products and services integration. The examples of the projects and research that have been or are currently conducted on PSS has been recognized and few of them are presented below.

The MEPSS (Methodology for Product Service Systems) was a project conducted by international team within 5th Framework Programme of European Union Funds. The project aimed to develop a methodology and toolkit to assist companies in finding, designing, developing and implementing complex innovations in which products and services are combined. MEPSS was conducted by a consortium of eight partners, which where academia and business representatives (more details can be found on the project website). The result of the project is webtool, accessible online on www.mepss.nl, where an organization can learn the methodologies in various fields of expertise that are needed to cover the various aspects to take into account while developing, implementing and monitoring new product service systems. Also the handbook on how to implement clean, clever and competitive strategies in European industries was published as an outcome of the project.

Professor Ursula Tischner in 1996 founded econcept, Agency for Sustainable Design, in Cologne (www.econcept.org). With econcept she carries out research and consulting projects with small and large companies and other organizations on sustainable and eco-design and innovation including the Product-Service Systems. SusProNet (a European Union network on Sustainable Product-Service Development, conducted in 2002-2004) was one of the numerous projects, in which the econcept agency was involved. The SusProNet focused its attention on the series of industry sector oriented workshops and conferences that aimed to provide examples of “Best Practice”, in order to form a platform for information and experience exchange, and to develop training courses for the ideal form of industry-authority interplay. In the final report of the project the conclusions on the lessons learned about the best approaches to PSS development is discussed in relation to responsibilities, differences to regular product development and the main tools and approaches used for analysis. Also an overview of the main drivers, opportunities for PSS, the contribution of sustainability and potential approaches for policy support are given (Charter, Adams, Clark 2004).

GrAT (Center for Appropriate Technology) is a scientific association for research and development of Appropriate Technology operating within Vienna University of Technology. Its representative of chair-

man, Myung Joo Kang, Ph.D., focuses in his work on product/service systems. Since 1986, GrAT has been proactively responding to a wide range of relevant issues in sustainable development, such as: sustainable building, renewable resources, product service systems (PSS), cleaner production, eco design. In 01.2006-01.2007 the Successful Strategies for Product Service Systems project was carried out in cooperation with econcept and Stenum GmbH (STENUM Environmental Consultancy and Research Company). The main goal of the project was to elaborate a development strategy for a successful PSS example/case study in the SME (small and medium enterprises) sector in Austria. The factors of success were tested and verified in parallel to the development of the design concept, while scenarios were valued for their relevance to sustainable development. After developing a systematic analysis of Austrian and international examples of successful and unsuccessful PSS, the most important criteria for success and failure were selected according to the chosen fields and target groups. Recommended actions for politic, companies and consumers were developed from the deduced success factors (<http://www.econcept.org>).

EDITPS (Edutainment for Designing Integrated Product-Service System) is an educational business game developed by Shimomura Laboratory, Tokyo Metropolitan University, Japan. The game is accessible online (http://www.comp.tmu.ac.jp/smmlab/research/EDIPS_e.html) and enables player to effectively and enjoyably learn the viewpoint of value amplification by combining products and services through active thinking in a simulated environment (Shimomura, Nemoto, Kimita 2014). The game was developed as a tool which enables designers who have only known traditional engineering and find rather difficult to obtain a mutli-disciplinary viewpoint, which is necessary in providing PSS in the manufacturing industry, spontaneously. This tool earned positive feedbacks during the 5th Industrial Produce-Service System conference and now trials of the game have been started in several university in various countries.

Professor Tobias Larsson from Blekinge Institute of Technology, Sweden, is a head of the Center for Sustainable Product-Service System Innovation (SPIRIT). The core of Prof. Larsson's scientific interest is within Product-Service Systems Innovation where the focus is on developing methods and tools for engineering product development and simulation applications in industrial settings to support development of sustainable product-service systems (PSS) that should create value on the market. The SPIRIT centre crucial current project is “Model Driven Development and Decision Support” (2013-2018)

which main goal is to support the rapid expansion of the research within Product-Service Systems, Strategic Sustainable Development, Innovative Product Development and Simulation Driven Design.

Professor's Rajkumar Roy from Cranfield University (United Kingdom) areas of expertise are: manufacturing, product and service design, through-life engineering services, defence and security, operational analysis and simulation, computing, simulation and modelling. He has been researching the concept of products and services integration for many years now and published numerous scientific articles on this subject (eg. Roy, Shaw et al., 2013; Bankole, Roy, 2012; Romero, Roy et al. 2012; Datta, Roy, 2011; Vasantha, Roy, et al.; 2011; Meier, Roy, Seliger, 2010). He studied particularly the defence and aerospace industry and the problems connected with implementing services in these sectors. Currently, he is a director of the EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services, which combines innovative research and engineering knowledge to tackle some major research challenges in through-life engineering services. The centre's core projects are among others: Reduction of no-fault found (NFF) through system design, Characterisation of in-service component feedback for system design and manufacturing and Improvement of system design process for whole life cost reduction (<http://www.through-life-engineering-services.org/index.php/research/core-projects>, 30.03.2015).

CIRP (The International Institution for Production Engineering Research) is the world leading organization in production engineering research and is at the forefront of design, optimization, control and management of processes, machines and systems. The Academy has restricted membership based on demonstrated excellence in research and has nearly 600 academic and industrial members from 50 industrialized countries. For last 6 years CIRP has organized International Conference on Industrial Product/Service Systems IPS2, which aims at increasing industrial and academic collaborations. The Conference brings together researchers, industrials and experts in this area, to exchanges ideas, innovations and recent progresses in providing concrete solutions to enhance world-class capabilities in enabling industry transformation towards more services. Since 2009, the CIRP International Conference on Industrial Product-Service Systems (IPS²) has become one of the most famous international forums to exchange recent developments, research findings and visions in the field of product-service systems (<http://ipss2015.emse.fr/>, 30.03.2015).

Professor Andy Neely, who is widely recognized for his work on the servitization of manufacturing,

carried out a global analysis on trends in manufacturing in 2007. Figure 4 illustrates the percentage of companies focusing on mixed offerings (products and services) which employ over 100 personnel and operate in manufacturing industry (data was gathered from the OSIRIS database, based on US SIC codes 10-39, i.e. from metal mining up to miscellaneous manufacturing) (Meier, Roy, Seliger, 2010). It is noteworthy that the revenue of the enterprises, which offer both services and products, constitutes a major share of all revenues while being represented by a less numerous group. This lead to a conclusion that the integrated product-service offerings produce higher incomes.

Whether Polish companies has not been examined in the survey or if the percentage of manufacturing companies that offer combined product-service mix was insignificantly greater than zero, it is presumable that the level of Polish companies which have the integrated product-service offerings is comparable to Japan's or China's level and thereby is significantly lower than Belgium's or USA's score. Polish scientific literature on Product-Service Systems is very limited (see: Michałowicz, 2014; Janczewski, 2014; Brzuste-wicz, 2012) and focused mainly on literature overview and application of PSS in certain market's sector. To the best of author's knowledge, no study on PSS has been undertaken by any polish academic institution or scientist.

4. INDUSTRIAL APPLICATION OF PSS – CASE STUDIES/EXAMPLES

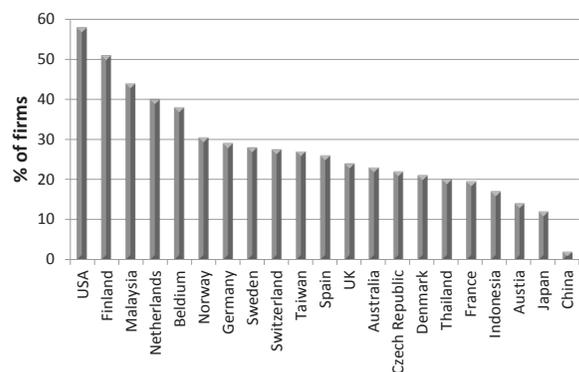


Fig. 4. Percentage of manufacturing companies with integrated product-service offerings
Source: (Meier, Roy, Seliger 2010)

In this section of the paper a few examples of successfully applied PSS are given. Noteworthy is that the success depends on the culture and habits of the clients' population. Some populations are more willing than others to accept the fact of resignation of the product ownership and find the use-oriented or result-oriented services more satisfactory instead. Ad-

ditionally, not every manufactured product can be easily combine with a service and specific services should be matched with appropriate kind of products only. The study of successfully applied PSS examples illustrates that it seems more likely to become a win-win solution if the machinery industry is concerned and/or the products of high price level are manufactured. That is why the decision of implementing the PSS into business strategy should be carefully considered, planned and designed and followed by the analysis of market and clients' preferences. The prototyping of product-service mix as a pilot project is also advised.

Rolls Royce Holding plc is in the literature one of the most commonly presented cases for successful integration of services and products. The company was founded in the 1987, in the process of Rolls Royce Limited privatisation, after the split of Rolls Royce (founded in 1906) into: Rolls-Royce Motor (cars producer) and Rolls-Royce Limited (aero-engines etc.). Over the past couple of decades Rolls-Royce has transformed itself from a lossmaking British firm into the world's second-biggest producer of large jet engines. For this purpose, it has deliberately blurred the lines between manufacturing products and offering services. The turbine blades, that they manufactured, cost about \$10,000 each, and were difficult to make because they had to survive high temperatures and huge stresses. Rolls-Royce's main rivals had also mastered the art. In such a competitive field an incremental advance by one manufacturer is usually matched by the others within a couple of years. Therefore Rolls-Royce decided to developed a new product - large jet engine - and explored this way the American market of aircrafts, as the company made engines for European aircraft manufacturers at the time. Innovative ideas that company adopted in new products were: the use of carbon composites to make fan blades and the change of the basic architecture of jet engines by using three shafts instead of two. The technology turned out very costly, but also fuel-efficient and more complex to design, build and maintain in comparison to the rivals' products. Additionally, Rolls Royce realized that in engine-manufacturing business more profits come from selling spares and servicing engines. And the product maintenance is the big pay-off service, which can be performed by independent firms. This is where Rolls-Royce has integrated its technology with a service to make it more difficult for competitors to pinch its business. Instead of selling airlines first engines and then parts and service, Rolls-Royce has convinced its customers to pay a fee for every hour that an engine runs. The company in turn promises to maintain it and replace it if it breaks down. "They aren't selling engines, they are

selling hot air out the back of an engine," says an investment analyst. Rolls Royce has been offering the service for more than a decade; more than half of its engines in service are covered by such contracts, as are about 80% of those it is now selling (<http://www.economist.com/node/12887368>, 29.03.2015).

Xerox International originally only produced photocopiers. Already many years ago, they also have developed their asset management programme, where products are sold or leased under contract, guaranteeing customer satisfaction through functioning machines as a fixed price per copy. Products and processes are designed for re-manufacturing. In recent years, they have developed into document full service and expertise company. They now offer a broad range of services including printing consultancy, document translation, software, support services and outsourcing services (<http://www.mepss.nl/>). Xerox reports that: "In 2013, 84% of our total revenue was annuity-based, which includes contracted services, equipment maintenance, consumable supplies and financing, among other elements. The remaining 16% of our revenue comes from equipment sales. (...) Our annuity revenue significantly benefits from growth in Services" (Xerox 2013 Annual Report).

Hydro Industries is an UK high-tech company making electro-based products for water purification.

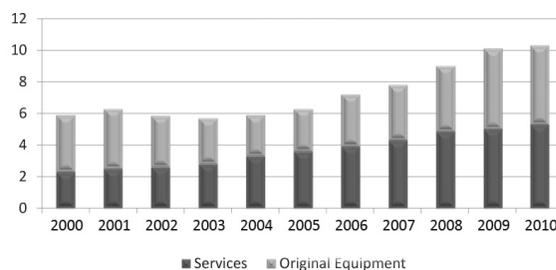


Fig. 5. Rolls Royce income structure form 2000 to 2010 (£ bn).

Source: <http://www.economist.com/node/18073351>, online, (21.02.2015)

Until 2009 it was focused on intensive development of its products only. Then, the company decided to introduce services related to the product they offered. The integrated product-service solution was carefully design and planned and finally prototyped. In 2011 the company launched a new product onto the market, which was a deployment treatment unit combined with the before- and after-sale services. Nowadays, Hydro's services are designed to provide a seamless working client relationship from initial site investigation through to design, manufacture, installation and after-sales on-site support and service maintenance. The services include also feed water charac-

terisation following the site investigation, the remote monitoring and control and the electrode management service. From six-staff company and £1,5 mln of turnover operating on British market at the beginning, it has grown to 30-employees enterprise with £3,5 mln turnover with an international client database and new factory facility (Thurston, 2013).

Examples given above show the profitability of Industrial Product Service Systems implementation,

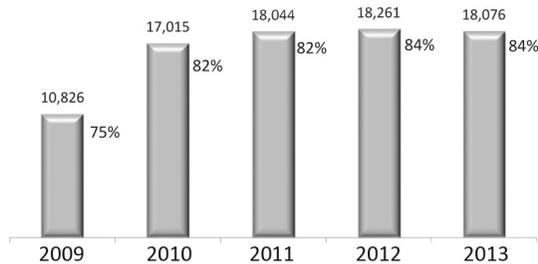


Fig. 6. Xerox annuity revenue from 2009 to 2013 (£ mln). Source: <http://www.xerox.com/annualreport/2013/assets/xerox-oar-2013-full.pdf>, online, accessed on 30.03.2015

especially from the manufacturer's point of view. The next and last example illustrates the way that IPS2 may be applied in industry company.

NILES-SIMMONS is a German machine tool manufacturer, which supplies tailor-made system solutions. With the products, which are machine tools and manufacturing equipment for aerospace industry, truck- and automotive industry, tools and die industry, railway and machine building industry, there are services of proactive maintenance integrated. The services are based on remote equipment observation, wear-analyses and error analysis which aim is to improve operational safety and process security. Furthermore, there are standard after-sale services offered, such as spare parts, trainings for the client's staff and field service, however these services need a customer initiative. The service of remote monitoring is a further step towards IPS2, as it requires the manufacturer (service provider) initiative, thereby it represents the availability-oriented business model (Meier, Roy, Selinger 2010).

CONCLUSIONS

An integration of physical products with intangible services become unavoidable even for companies operating in manufacturing sector which originally focused mainly on the product and its sale. Although integrating industrial production with service providing poses many innovative challenges for the manufacturing industry at many levels, the examples of those who already applied such solution in its strate-

gy prove profitability, in some cases of significant volume. The benefits that accrue from introduction of the PSS into business strategy are not only economic, but also ecological and social. The PSS idea development follows the sustainability economic growth concept. Less environment impact can be obtain for instance through alternative of use a product instead of purchase. Customer, on the other hand, receives benefits from a flexible and personalized service and quality advantages of products and services.

The Product-Service Systems (and/or Industrial PSS) is still an emerging scientific field, which is demonstrated by the rising number of articles published in last years. Nevertheless, the subject seems to be neglected in Polish academic publications and research. This article presents the review of a Product-Service System concept and its application in industry sector. The author is particularly interested in the system approach and analysis methods that may be employed in PSS planning and developing. The potential of Polish industry sector in terms of PSS implementation will be studied in details in the future as well.

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