



Industrial Product-Service Systems (IPS²)

Proceedings of the
1st CIRP IPS² Conference

Rajkumar Roy, Essam Shehab
Editors

Editors

Professor Rajkumar Roy, Dr. Essam Shehab

Cranfield University
Cranfield
Bedford
MK43 0AL
UK

ISBN 978-0-9557436-5-8 Cranfield University Press

© Cranfield University 2009

All rights reserved. No part of this publication may be reproduced without the written permission of the copyright owner.

1st CIRP IPS² Conference 2009
Industrial Product-Service Systems (IPS²)

01-02 April 2009, Cranfield University, UK

Organised by
Cranfield University, UK

Sponsored by

MORI SEIKI
THE MACHINE TOOL COMPANY

BAE SYSTEMS

S4T

S4T - Support Service Solutions: Strategy and Transition

Conference Chairman

R. Roy, Cranfield University, UK

International Scientific Committee**CIRP**

J Aurich, Germany
D Brissaud, France
P Gu, USA
M Z Hauschild, Denmark
S Kara, Australia
F L Krause, Germany
H Meier, Germany
L Monostori, Hungary
G Moroni, Italy
A Nee, Singapore
M Rese, Germany
G Schuh, Germany
G Seliger, Germany
W Sihn, Germany
D Spath, Germany
S Takata, Japan
T Tomiyama, The Netherlands
E Uhlmann, Germany

Non CIRP

T Baines, UK
S Evans, UK
M Henshaw, UK
L Leifer, USA
N Morelli, Denmark
A Neely, UK
A Tukker, The Netherlands
Y S Kim, Korea

Local Organising Committee

A Al-Ashaab
P Baguley
R Barrett
D Baxter
E Benkhelifa
S Bolton
P Datta
I Ferris
M Goatman
M Grant
H Hassan
J Mehnen (Organisation Chair)
D. Saxena
E Shehab (Programme Chair)
A Tiwari (Finance Chair)
B. Tjahjono
Y. Xu
T Bandee, (Organisation Secretary)
E Pennetta
L Brady

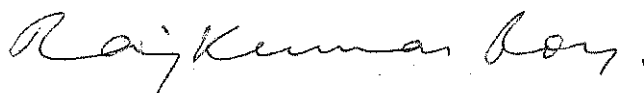
Foreword



Most western manufacturing companies are shifting the focus of their business strategy towards selling services or functionality instead of products. The product-service systems (PSS) strategy has a great impact on customers, product life cycle and company strategy. The design of PSS is a complex problem, and must meet the challenges of the changing financial and resource models that align with PSS strategy. A better understanding of knowledge resources is needed in order to meet these challenges. This business strategy also has significant impact on reducing material consumption and thus minimising environmental impact. New developments are taking place in industrial markets, in the form of Industrial Product-Service Systems (IPS²). An IPS² is defined as "an integrated industrial product and service offering that delivers value in use". This integrated understanding leads to new, user-centric solutions. IPS² represents a change in the competitive strategy for manufacturing companies, enabling innovative function, availability and results-oriented business models. The CIRP IPS² Conference is lead by the CIRP IPS² Working Group. This is a multidisciplinary working group that is supported by STC A, STC Dn and STC O within the CIRP. This 1st CIRP IPS² Conference has 51 technical papers in the proceedings from 17 countries. This shows the popularity of the topic within CIRP and the outside research community at large.

The conference has 9 technical sessions, 2 keynotes and one invited presentation. In addition the second day of the conference includes an industry panel discussion and industry visits. Over 75 participants are expected to attend the conference. This IPS² conference will focus on research into design, cost of IPS², novel business models, informatics, service networks, industrial and academic experience with IPS² and integration of the various business components that support the PSS: marketing, design, manufacturing, logistics and maintenance.

I would like to take this opportunity to thank all the authors for their quality research, industry panel members for their contributions, the international scientific committee members for their support in reviewing the papers and the local organising committee for their meticulous preparation for the conference. I would like to specially thank Dr. Jorn Mehren, Dr. Essam Shehab, Dr. Ashutosh Tiwari and Mrs Teresa Bandee for their significant contributions towards the success of the conference. I would also like to thank our sponsor Mori Seiki, - the machine tool company, BAE Systems, S4T project and the exhibitors for their support for the conference.

A handwritten signature in cursive script that reads "Rajkumar Roy".

Professor Rajkumar Roy
Chairman
CIRP IPS² Conference, 2009

Table of Contents

Keynote Paper

- Service Engineering as an Approach to Designing Industrial Product Service Systems
G. Schuh, G. Gudergan.....1

Design

- Multi Operator BTS Aesthetic Tower Design for Metropolitan City
A. Windharto, A. Setiawan.....8
- Continuous Improvement of Industrial Product-Service Systems
E. Schweitzer, C. Mannweiler, J.C. Aurich.....16
- Service Development and Implementation - A Review of the State of the Art
M. Torney, K. Kuntzky, C. Herrmann.....24
- A Product-Service System Representation and its Application in a Concept Design Scenario
Y.S. Kim, E. Wang, S. W. Lee, Y.C. Cho32
- Empirical Study Concerning Industrial Services within the Austrian Machinery & Plant Engineering Industry
K. Matyas, A. Rosteck, W. Sihn.....40
- Strategies for Designing and Developing Services for Manufacturing Firms
A. R. Tan, D. Matzen, T. McAloone, S. Evans.....46
- A Method of Supporting Conflict Resolution for Designing Services
Y. Akiyama, Y. Shimomura, T. Arai.....54
- Product-Service Systems - From Customer Needs to Requirements in Early Development Phases
A. Ericson, P. Muller, T. Larsson, R. Stark.....62
- Evaluation of 'Design Loops' to Support the Design of Product Service Systems: A Case Study of a Helium Liquefier
N. Maussang, P. Zwolinski, D. Brissaud.....68
- Product/Service Systems Experiences - an International Survey of Swedish, Japanese, Italian & German Manufacturing Companies
M. Lindahl, T. Sakao, E. Sundin, Y. Shimomura.....74
- Service and Manufacturing Knowledge in Product-Service Systems: a Case Study
N. Doultzinou, D. Baxter, R. Roy, J. Gao, A. Mann.....82

Informatics

- Comprehensive Complexity-Based Failure Modelling for Maintainability and Serviceability
K. T. Meselhy, H. A. ElMaraghy, W. H. ElMaraghy.....89
- Informatics-Based Products-Service Systems for Point-of-care Devices
O. Ajai, A. Tiwari, J.R. Alcock.....94
- Service Information in the Provision of Support Service Solutions: A State of the Art Review
S. Kundu, A. McKay, R. Cuthbert, D. McFarlane, D. Saxena, A. Tiwari, P. Johnson.....100
- An Infodynamic Engine Approach to Improving the Efficiency of Information flow in a Product-Service System
C. Durugbo, A. Tiwari, J.R. Alcock.....107
- A Periodicity Metric for Assessing Maintenance Strategies
K. T. Meselhy, W. ElMaraghy, H. A. ElMaraghy.....113
- Development of an Extended Product Lifecycle Management through Service Orientated Architecture
J. Cassina, A. Cannata, M. Taisch.....118
- ## Business Models
- Multimodal User Support in IPS² Business Model
R. Gegusch, C. Geisert, B. Hoege, C. Stelzer, M. Roetting, G. Seliger, E. Uhlmann.....125
- Framework for the Integration of Service and Technology Strategies
E. Juhling, M. Torney, C. Herrmann, K. Droder...132
- Strategy Assessment and Decision based Implications for Integrated Product-Service-Suppliers
R. Schmitt, S. Hatfield.....140
- A Framework for Cross Disciplinary Efforts in Services Research
P. J. Wild, P. J. Clarkson, D. C. McFarlane.....145
- New Models for Sustainable Fashion Industry System: A Case Study about Fashion Net Factories
P. Ranzo, M.A. Sbordon, R. Veneziano.....153
- Product Service Value Analysis: Two Complimentary Points of View
T. Alix, Y. Ducq, B. Vallespir.....157

Business Implications of Integrated Product & Service Offerings
M. Lindahl, T. Sakao, A. Ohrwall Ronnback.....165

Innovative Service-Based Business Concepts for the Machine Tool Building Industry
S. Biege, G. Copani, G. Lay, S. Marvulli, M. Schroter.....173

A Method to Analyse PSS from the Viewpoints of Function, Service Activity & Product Behaviour
T. Hara, T. Arai, Y. Shimomura.....180

Use-orientated Business Models and Flexibility in Industrial Product-Service Systems
A. Richter, T. Sadek, M. Steven, E. G. Welp.....186

Analysis of Integrated Product and Service Offerings from Current Perspectives of Providers and Customers
T. Sakao, E. Sundin.....193

Cost Engineering

Uncertainty Challenges in Service Cost Estimation for Product- Service Systems in the Aerospace and Defence Industries
J. Erkoyuncu, R. Roy, E. Shehab, P. Wardle.....200

Identifying Risk and its Impact on Contracting through a Benefit Based-Model Framework in Business to Business Contracting: Case of the Defence Industry
I. Ng, N. Yip.....207

Cost Modelling Techniques for Availability Type Service Support Contracts: a Literature Review and Empirical Study
P. P. Datta, R. Roy.....216

Cost Evaluation Method for Service Design Based on Activity Based Costing
K. Kimita, T. Hara, Y. Shimomura, T. Arai.....224

Affordability Assessment of Industrial Product-Service System in the Aerospace Defence Industry
O. Bankole, R. Roy, E. Shehab, P. Wardle.....230

An Aerospace Component Cost Modelling Study for Value Driven Design
J.M.W. Cheung, J. P. Scanlan, S. S. Wiseall.....238

Profitability of Industrial Product Service Systems (IPS²) – Estimating Price Floor and Price Ceiling of Innovative Problem Solutions
M. Steven, M. Rese, T. Soth, W. Strotmann, M. Karger.....243

Life Cycle Cost-Orientated Service Models for Tool and Die Companies
G. Schuh, W. Boos, S. Kozielski.....249

Obsolescence Challenges for Product-Service Systems in Aerospace and Defence Industry
F. Romero Rojo, R. Roy, E. Shehab, P. Wardle.....255

Sensitivity Cost-Benefit Analysis to Support Knowledge Capture of Industrial Interests
A.M. Paci, M.S. Chiacchio.....261

Whole Life Cycle

Metadata Reference Model for IPS² Lifecycle Management
M. Abramovici, M. Neubach, M. Schulze, C. Spura.....268

Remanufacturing on a Framework for Integrated Technology and Product-System Lifecycle Management (ITPSLM)
A. G. Filho, D. A. Pigosso, A. R. Ometto, H. Rozenfeld.....273

Commercializing Sustainable Innovations in the Market through Entrepreneurship
D. Keskin, H. Brezet, J. C. Diehl.....280

Environmental Impacts of Rental Service with Reconditioning - A Case Study
R. Khumboon, S. Kara, S. Manmek, B. Kayis.....288

The Practical Challenges of Servitized Manufacture
T. Baines, H. Lightfoot.....294

Challenges for Industrial Product/Service Systems: Experiences from a learning network of large companies
E. Sundin, G. O. Sandstrom, M. Lindahl, A. Ohrwall Ronnback, T. Sakao, T. C. Larsson.....298

Service Network

Dynamic IPS²-Networks and Operations Based on Software Agents
H. Meier, E. Uhlmann, C. M. Krug, O. Volker, C. Geisert, C. Stelzer.....305

Standardization of Service Delivery in Industrial Product-Service Systems
H. Meier, C. M. Krug.....311

Engineering Network Configuration: Transition from Products to Services
Y. Zhang, J. Srail, M. Gregory, A. Iakovaki.....315

Roadmap to Self-Serving Assets in Civil Aerospace
A. Brintrup, D. C. Ranasinghe, S. Kwan, A. Parlikad, K. Owens.....323

The Chinese Service Industry as a Challenge for European SME: A Systematic Approach for Market Entry
R. Schmitt, S. Schumacher, C. Scharrenberg.....331

Industrial Services Reference Model
M. Gerosa, M. Taisch.....336

Empirical Study Concerning Industrial Services within the Austrian Machinery and Plant Engineering Industry

K. Matyas, A. Rosteck, W. Sihn

Institute for Management Science, Vienna University of Technology

Theresianumgasse 27, A-1040 Vienna, Austria

matyas@imw.tuwien.ac.at

Abstract

Industrial Services adapted to the requirements of the customers and aligned with the specifications of the physical products are becoming increasingly important for companies in the engineering industry in order to remain competitive and to ensure long-term economic success.

An empirical study in the Austrian machinery and plant engineering industry should systematically evaluate and document corporate practice with regard to services.

The current service landscapes in companies and the development of customer requirements have been investigated. The result of the study is a general idea of what the future needs for action in these companies as well as in applied research are.

Keywords:

Industrial Services; Engineering Industry; Service Development, Service Management

1 INTRODUCTION

Machinery and plant engineering will in future be characterised by increasing global competition. The growing competition and cost pressure from the Far East in particular will make it more difficult for machinery manufacturers to differentiate themselves from competitors simply on the basis of their products.

The service sector in machinery and plant engineering is a very important success factor for the companies with an increasing impact. Industrial services are no coproducts of the production sector. Innovative industrial services are independent corporate strategies.

In these general conditions it is especially important for companies to recognise industrial service as one of the factors for success in the coming years and to undergo the transformation from just a producer to a "producing service provider". What is of decisive importance in this process is to have a clear strategy for the area of service rooted in the company and to support and implement these on the basis of standardised and practiced processes and methods.

Innovation in service also offers considerable opportunities to achieve differentiation from the competition and to increase customer loyalty. On average, service products achieve higher returns than the tangible product "machine" or "plant" and thus make a substantial contribution to ensuring a company's long-term success and competitiveness.

This study deals with the business practice of service, i.e. with the organisation, processes and development of services and with future challenges, and presents a clear picture of the current situation in the industry and of the direction in which companies must develop.

2 OBJECTIVES AND METHODOLOGY

2.1 Objectives

The study "Establishing the requirements for service concepts in Austrian machinery and plant engineering" was conducted by the Institute for Management Sciences of

the Vienna University of Technology on behalf of the FMMI (Association of Austrian Machinery and Metalware Industries).

The study was conducted in the period from October 2007 to May 2008.

The aim of the study was to investigate current business practices in the area of service in companies engaged in machinery and plant engineering and to identify future trends. In addition, recommendations should be given on what steps should be taken to improve service performance.

At the centre of interest were the member companies of the FMMI, in particular in the sectors "machine tools" and "woodworking machines".

The main questions asked in the study are:

- What services does your company offer?
- What is the significance (turnover, revenues, strategy etc.) of the service area in your company?
- How important is the development of services?
- What are the future trends and developments and where do the companies see the need to act in view of these trends?

2.2 Methodology

The design of the study was performed according to the principles of a combined investigation. On the one hand a quantitative investigation based on a questionnaire was carried out to achieve a higher sample size with the same employment of resources.[1] On the other hand also a qualitative investigation in form of semi-structured interviews with selected companies from the sectorial groups "machine tools" and "woodworking machines" was conducted to gain more detailed results. [2]

The methodology in detail:

- Dispatch of the questionnaires to companies from the sectors in focus
- Follow-up by telephone

- Conducting structured telephone interviews with FMMI companies involved in machinery and plant engineering
- Conducting semi-structured interviews at selected companies in the sectorial groups.

Study participants:

- Total number of FMMI member companies contacted: approx. 700
- Response rate approx 10% (including 7 interviews)

3 RESULTS OF THE STUDY

3.1 Group of participants (companies)

The study's focus was the machinery and plant engineering sector in Austria, which accordingly accounted for 90% of the companies polled.

The corporate structure of the firms participating in the study reflects the corporate landscape in Austria:

More than half (56%) of the responses received come from small and medium-sized enterprises as defined by the European Union (EU). 55% of the companies have a turnover of ≤ 50 million euros (SMEs), 20% are small enterprises with turnover of ≤ 10 million euros.

The reason why so many small and medium-sized companies were considered in the study is the distinct situation of companies in Austria. More than 60% of the employees are working in small and medium-size enterprises due to the fact that less than 1% of the Austrian companies exceed a size of 250 employees.

3.2 Importance of service to the companies

Figure 1 shows that on average approx 9% of the total workforce works in the area of service in the companies, straight service businesses excepted.

A direct correlation between the proportion of service staff compared with the total workforce and the success of the company in the area of service (measured by the operating margin in service) cannot be established.

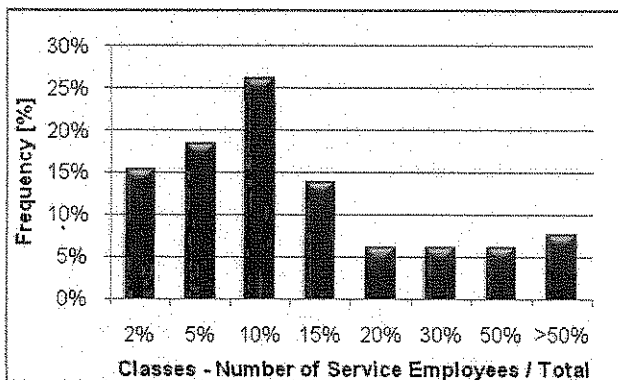


Figure 1: Number of service employees compared to the total number of employees

The average turnover generated by the companies with service, straight service businesses excepted, amounts to approx. 11%. This value is towards the lower limit in an international comparison. In comparison: in Germany approx. 27% of turnover in machinery engineering is accounted for by service [3].

In this context it is also worth noting that a large proportion of the firms interviewed stated that a goal of 15% was the maximum that was aimed for.

The best in this class achieve over 30% turnover with service and the worst around 1%, with the best in class

having a large proportion of service employees among the total workforce.

Approx. 20% of the companies contacted in the course of the study provide no service at all.

The return on the service business is on average higher than on the traditional business with new machinery:

- Two thirds of all companies generate a maximum return on services twice as high as that on the traditional business
- 10% of companies even achieve a return on service business that is 6 times as high as that on traditional business
- The net returns that can be achieved vary within the portfolio of services offered, for example:
 - spare parts business: 10%-30%
 - training: 2%-5%

What are the prospects, in the opinion of the companies, for the development potential both for turnover and for returns on service business in the medium term (over the next 4 years)?

The majority of companies (>60%) see no or only limited opportunities for increasing turnover and returns in the area of services in the next 4 years (see figure 2).

However, none of the companies expects returns or turnover from services to decrease, and the expected growth rates are independent of the size of the company.

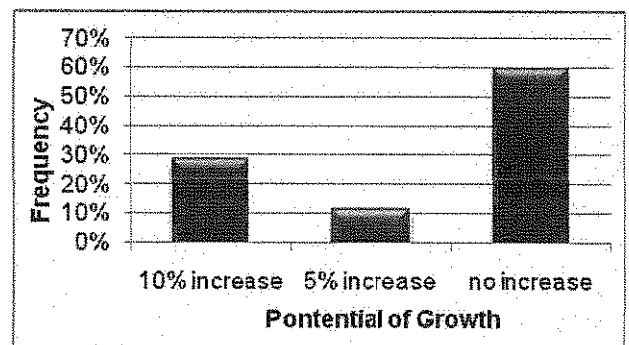


Figure 2: Expected growth in service turnover in the next four years

The underrated opportunities for increasing returns in the area of service suggest in part a lack of strategic direction in service, which is something that will be demonstrated later.

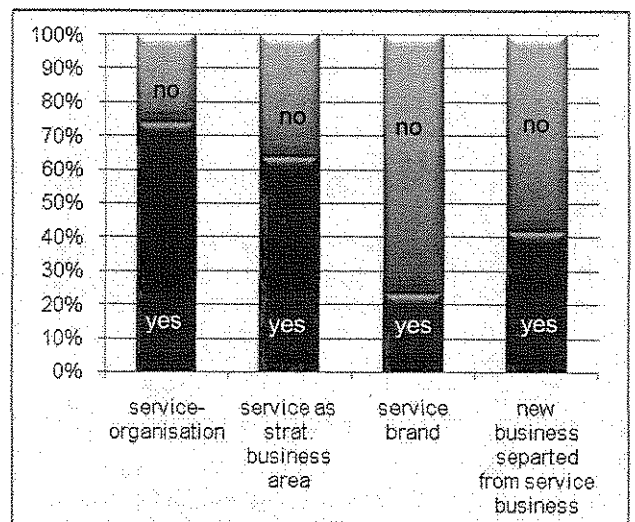


Figure 3: Organisation of services

With regard to the way services are organised it can be stated that more than 66% of the companies have their own organisation for service – in most cases within the normal organisation.

Figure 3 attempts to illustrate that for 64% of the companies service is a strategic field of business that should be addressed with a clearly formulated service strategy. However, the relatively low growth expectations (see Figure 2) show that actions are not completely aligned with strategy or that the company does not have a clear strategy.

23% of the companies run their service business under a different serve brand (competitive differentiator, customer brand identification,...).

A correlation can be established between a positive response to the questions and the turnover in the area of services. Large companies thus have a more distinctive service organisation than small ones. Operating the service business under a separate brand is more likely to be carried out by larger companies.

3.3 Services offered in the companies

In principle, the current range of services offered by the companies includes services, product upgrades and customer support as shown in figure 4.

- "Classic services", i.e. services characterised by low innovation, still play the main role for the companies surveyed.
- Maintenance and servicing or repairs together with the spare parts business are the most widespread services [4]
- Individual and special services are frequently neither offered as standard nor promoted but provided on an ad hoc basis in response to a customer's request.

There is a basic correlation between a company's size and the number of services it offers: large companies offer a higher number of services than small ones. No correlation can be established between the number of services offered and the success of the company (e.g. return on the service).

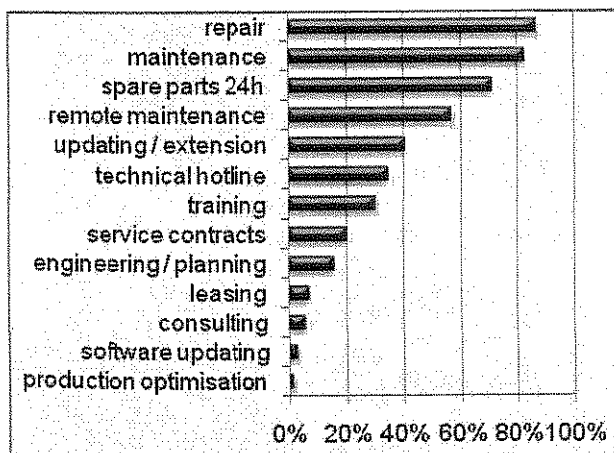


Figure 4: Services offered

25% of the companies surveyed indicate that they offer results-oriented business models and/or operator models [5].

Here in detail the most important business model, with a share of 19%, is machine availability. TCO models (TCO – Total Cost of Ownership) do not currently play a large role for the companies (approx. 4%) and operator models

are not very widespread among the companies surveyed. Only approx. 6% say that they offer operator models.

Currently, results-oriented models only play a subordinate role in comparison with the classic services.

The question regarding the three strongest selling services in the company reveals that the most frequently offered services are those which generate the highest turnover for the companies: repairs, spare parts and maintenance are the services generating most turnover for more than 75% of the companies. Only very limited turnover is currently generated with more innovative service concepts or business models.

3.4 Service development

In figure 5 it is shown that the most important triggers for developing new services are customer requirements and requests. Accordingly, most ideas for new services originate from customer enquiries. The companies are primarily customer-driven and are in particularly not proactive and innovative when it comes to developing new services. It is only the secondary answer "technical potential" that indicates that services are also developed on the companies' own initiative.

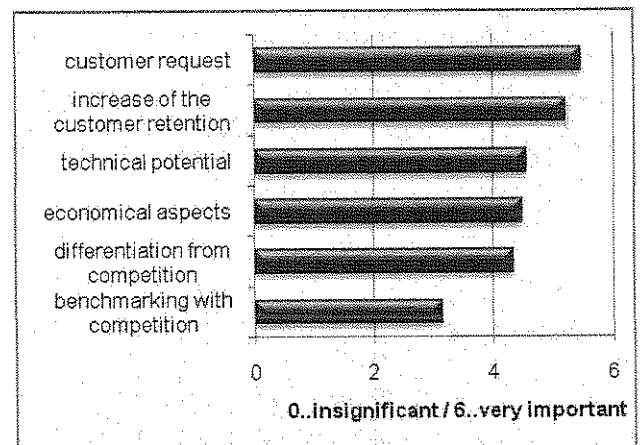


Figure 5: Triggers for developing services

In order to be able to develop services successfully it is important to have clearly defined, standardised and practiced development processes in the company that are supported by appropriate methods. In this area, more than two thirds of the companies state that they have standardised development processes with written documentation. However, a systematic methodology-based approach is not very widespread and special methods for developing services are not widely employed. When methods are used, they are split approximately equally between creativity techniques and process modelling methods.

When performing comprehensive service development there are four fundamental aspects that must be defined:

- product model – describes the scope of services
- process model – formulates the processes that are necessary to deliver the service
- resource model – determines the resource required to deliver the service
- marketing concept – specifies the strategies and instruments used to market the service

The survey results show a recognisable fundamental importance for systematic and structured service development for the companies, but the variance of the answers among the individual activities of service development is high, i.e. the companies rate this very differently.

- ➔ A structured and continuous development process for industrial services is hardly implemented in most of the companies.

3.5 Marketing and customer communications

As described above, customer requests are the most common trigger for the development of new services. This explains why the most important sales channel for the companies is customer contact by sales representatives. Other marketing methods, apart from each company's website, play a subordinate role. Defining a marketing strategy during the development of the service is of decisive importance for its subsequent economic success.

What factors make a service successful from the point of view of the companies selling it? The quality and advantages of the service are critical for its success on the market; in a similar manner customer communication is seen as an important success factor, with a well defined interface to the customer being essential.

The primary communication channel to the customer (approx. 45%) is the sales representative; less than 20% of the companies use the instrument of regular and standardised customer surveys. A well functioning complaints management process is indispensable as a part of service quality management and is underrepresented in the companies' answers (<15%).

In figure 6 the most important reasons why the companies think their customers buy services are shown.

- In the first instance it is the lack of customers' specialist knowledge that makes them have to buy services externally.
- The quality of the service is also an important reason for buying. This can be seen primarily in connection with customer retention.

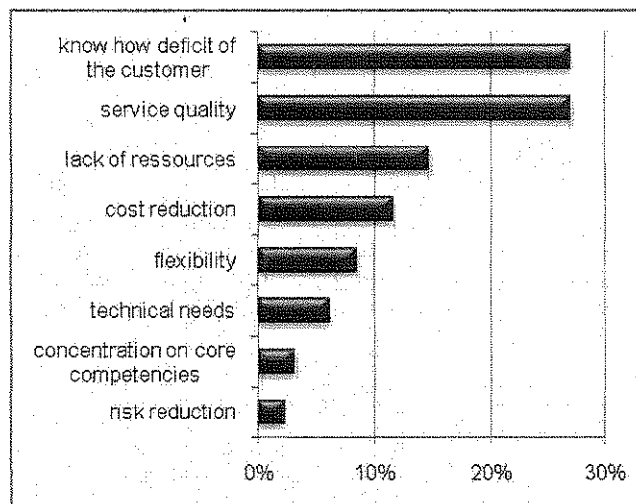


Figure 6: Reasons why customers buy services

When the companies are asked what properties make services attractive to them and what demands they place on their service providers, it is revealed that

- quality, flexibility and speed of the service / suppliers are important characteristics for the companies as service customers, and that
- the price may perhaps play a subordinate role but that it is still an important factor in terms of price-performance.

3.6 Challenged and future developments

As shown in figure 7 the biggest difficulties that companies have to face when providing services are primarily:

- a lack of personnel within the company that can provide services in the required quality
- ➔ Developing services systematically can also help to reveal deficits in this area at an early stage (see "resource model").

Other factors mentioned are primarily the agreement on customer interface and the service organisation. In particular the poor coordination of the internal organisation and processes often leads to a potential lack of resources.

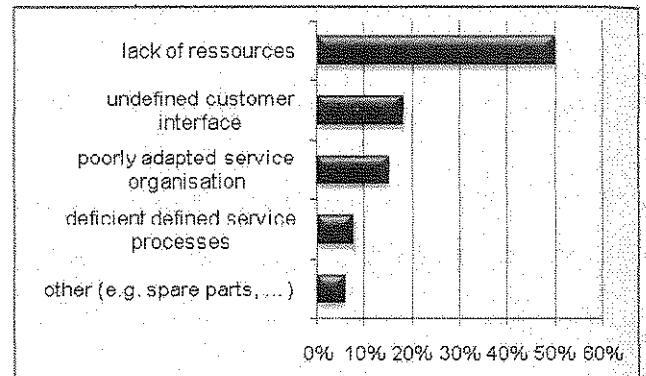


Figure 7: Providing services - problem areas

In answer to the question about which services or business models should be developed in future and which existing ones extended, the companies stated that they intend above all to intensify close customer contacts, i.e. customer care should be improved and the whole direction of the service more closely aligned with the customer (Figure 8).

Furthermore, it is in the area of classical services (maintenance, repairs, on-site service) that the companies see the need for further development.

One interesting exception here is the number of times full service offers and service master plans are mentioned

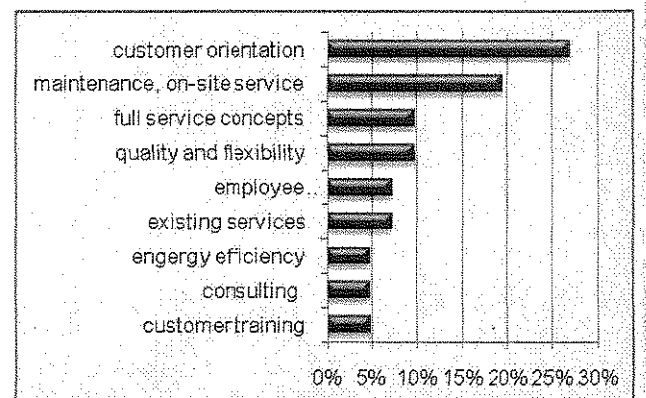


Figure 8: Further development of services and topics

What significance do the companies surveyed attach to classic as well as to more innovative business models (see also figure 9)?

- Classical services will continue to play a dominant role for the companies surveyed in the medium term
- The demand for results-oriented business models and operator models is likely to remain low over the next 5 years
- It is nevertheless remarkable that the average of the individual answers is relatively high, i.e. innovative

business will also become more important, at least in the long term

An international comparison at this point reveals that business models that feature measurable added value will become increasingly important.

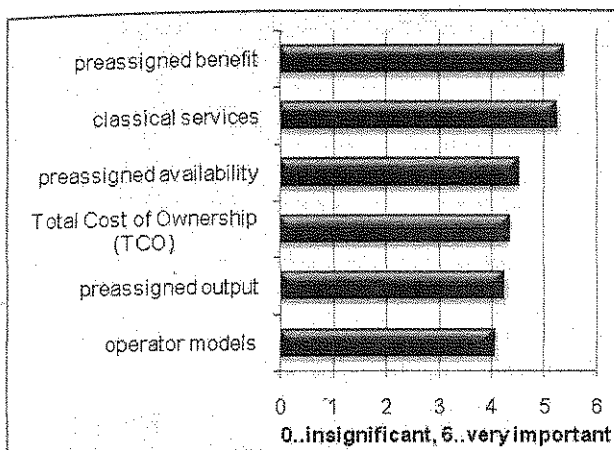


Figure 9: Significance of services and business models

The final question is concerned with the companies' biggest need for action with regard to services.

Based on the relatively high average values of the individual answers it can be assumed that the companies see a generally big need for action in the area of service.

Examining this in detail, we see in the top two positions answers describing customer ties. The companies obviously have the impression that they ought to pay more heed to customer wishes and requirements. In particular the knowledge that staff with customer contacts should be put to greater use.

One further important point mentioned was the further development of service strategy. This can be seen especially in the context of the results in figure 10, since the expected growth rates in service suggest that the service strategy in the companies is not consistent. What is more, one third of the companies have not defined any form of strategy for service.

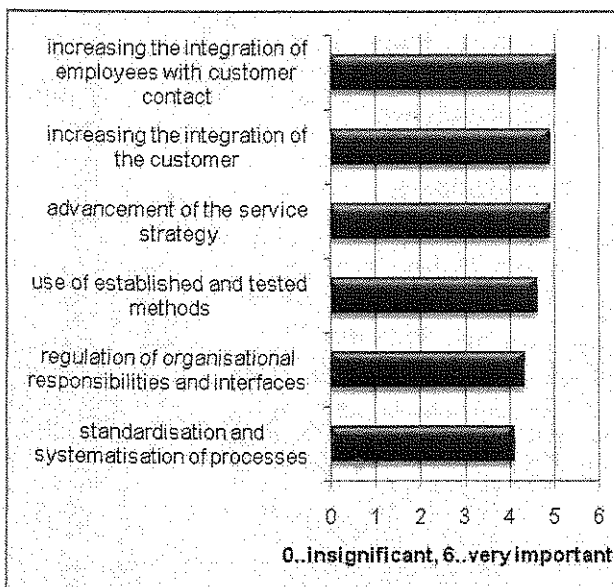


Figure 10: Future need for action

The last answers can be grouped under the heading of need for organisational action within the companies. This

includes improvements to methodology approach, the coordination of interfaces and process standardisation.

4 CONCLUSIONS AND RECOMMENDATIONS

Services are extremely important for the future economic development of the machinery and plant engineering industry in Austria. The study shows that the participating companies have generally recognised the importance of services for their ability to compete. However, this is only partially reflected in way they approach the issue in their business practice.

4.1 Strategic aspect

From the strategic point of view the following conclusions can be drawn from the results of the study.

The companies surveyed stated that service is an important selling point and instrument for customer retention. However, the majority of companies practice reactive service management.

The significance of service as a strategic area of business was rated very high by almost all the companies surveyed; however there is not much evidence of strategic orientation in the service field and existing service strategies are only pursued half-heartedly. Moreover, the required professionalisation of the service area is not yet sufficient.

This results in the following recommendations for action concerning both companies as well as research institutions, as the latter could very well provide support for the companies.

- ➔ Development of a consistent service strategy throughout the company with the aim of providing the customer with measurable added value.
- ➔ This requires a change of thinking in the industry – a transformation of the companies from simple producers to producing service providers can ensure the success of the companies.

4.2 Operative aspect

The following conclusions can be drawn from the operative point of view of the service field.

Very few of the companies surveyed expect a systematic and structured development of services with the support of methodologies.

The companies surveyed are well aware of the importance of being close to customers and knowing their requirements, and the closer integration of both the customer and staff with customer contacts in the development of services is considered to be very important for the future.

A further important finding from the survey is that service organisation and process standardisation are seen as important for providing professional services but these are not applied universally.

Innovative services and business models are not widespread in the areas of Austrian industry under consideration. This means that there are currently big opportunities for "first movers" in the market.

The recommendations for action for academia and industry in the operative field are as follows:

- ➔ standardisation and optimisation of core service processes with continuous controlling
- ➔ increased use of methods throughout the service process (from development to delivery)

- the application of quality management in the area of service is of decisive importance as the quality of service was mentioned in the survey as a very important selling point

4.3 Demand for further research

The results of the study show large contradictions between the appraisal of the importance of service for the companies and the actual strategies practiced. On the one hand the companies recognise the importance of service but have too little specialist knowledge and too few resources to take advantage of these opportunities successfully, on the other hand this fact makes it necessary to conduct research into the field of service (development methodologies, organisation, quality management) in order to equip the companies appropriately for a

successful implementation of industrial product service systems.

5 REFERENCES

- [1] Schnell, R.; Hill, P.; Esser, E., 2005, Methoden der empirischen Sozialforschung, 7. Auflage]
- [2] Ebster, C.; Stalzer, L., 2008, Wissenschaftliches Arbeiten für Wirtschafts- und Sozialwissenschaftler, 3. Auflage
- [3] Impuls Management Consulting, Survey, 2007
- [4] Matyas, K.: 2008, Taschenbuch Instandhaltungsgistik, Hanser Verlag München
- [5] Roy, R., 2008, Evaluating PSS Business Models for Machine Tool Industry. International Seminar on PSS, Bochum