

Analysis of Integrated Product and Service Offerings from Current Perspectives of Providers and Customers

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Abstract

This paper reports the current status of how companies address IPSO (Integrated Product and Service Offerings)-typed business. It will consist of perspectives both from providers and customers mainly from Sweden and Germany. Especially, it selects how providing firms address uncertainty as one focal issue. As a result of interviews, factors from customers are the major source of uncertainty for an experienced company, while services are the major for little experienced companies. In addition, there was found to be a reasonable wish of providers to obtain a formalized way leading to quantitative management of uncertainty. On the other hand, customer incentives are not always clear. While some customers find the IPSO preferable from economic reasons other customers have the opposite recognition.

Keywords:

Integrated Product and Service Engineering (IPSE), Product/Service Systems (PSS), development, risk, opportunity, uncertainty, business model.

1 INTRODUCTION

Manufacturers today regard service activities as increasingly important. Some manufacturing firms are shifting from a “product seller” towards a “service provider” [1]. One reason from the demand side is servicification of customers’ activities, which in some cases means a shift from customers’ owning physical products to getting access to the functionality of products. In the supply side, parallel to the trend above, concepts such as Functional Sales [2] are already found in not only theoretical but also practical fields in industries. Other related concepts include Total Care Products (Functional Products) [3, 4], which comprises combinations of hardware and support services, Product/Service Systems (PSS) [5, 6], Service Engineering [7-9], and Industrial Product Service Systems (IPS2) [10]. Especially, in the field of technical services in the production industry, addressing business models and service design processes are argued to be important [11, 12].

This is also one way to decrease the environmental impacts from the usage phase such as energy and resource consumption, since providers could control the product usage in a better way with their knowledge on products than their customers. It should be noted that in many cases the dominant environmental impacts originate the product usage phase.

Our group at Linköping University and the Royal Institute of Technology in Sweden has been, based on our research of Functional Sales, further researching a new engineering way termed Integrated Product and Service Engineering (IPSE) [13, 14]: The group has worked together with over 20 SME on a methodology for developing Integrated Product and Service Offerings (IPSO). IPSO is defined as an integrated offer of physical products (artefacts such as hardware and software) and service activities (activities by people to provide customer value). The IPSE methodology aims to create better prerequisites for firms to develop IPSO that are beneficial for the supplier firm, the customer, and for the society at large.

This paper reports the current status of how companies address IPSO-typed business. Our previous survey was only with providers [15], while this paper will consist of perspectives both from providers and customers. In addition, it selects how providing companies address uncertainty as one focal issue based on a conclusion in our previous work [16].

2 THE GOAL OF THIS RESEARCH

In spite of the high attention on IPSO/IPSE by industries, knowledge/experience to support those companies is not sufficient at present. Especially, the implications on how companies had better run business have not yet been much presented theoretically. Thus, those companies wishing to enter IPSO-typed business cannot be supported enough at present.

The final goal of this research is to develop a method/tool to support companies with plan/design IPSO in a better way. Specifically, it is to develop a method/tool to help them with address properties peculiar with IPSO.

In our previous work [16], it was found that one of the most crucial impacts on the business with IPSO originates from the shift of these offerings from being static to dynamic. Being dynamic means here that the offerings (what and when to do) may not be determined completely due to the uncertainty along the time dimension. For instance, repair in a full-service contract cannot be projected regarding when and how often. This may be quite obvious, if considering that a contract for service has a time dimension and connote future events as opposed to that for a physical product (except for a period of quality guarantee as free service).

Therefore, a crucial issue of IPSE exists in outside of designing/developing a static offer. To be able to design/develop merely a complex but static solution is insufficient, as the business logic of IPSO is often different and, especially, risk-taking tends to increase.

Having the above as the final goal in mind, this paper first of all analyzes IPSO for providers with one focal issue of how to address uncertainty. In addition, the customer perspectives will be brought. As customers need a new mindset for IPSO-type business, the customer incentives and acceptance will be addressed especially in this paper.

3 RESEARCH QUESTIONS OF THIS PAPER

The research questions (RQ) for this paper are formalized as follows. The first six are from the provider's perspective, while the last two are from customer's.

RQ1. What are major drivers/challenges for companies to provide IPSO?

RQ2. What are major prerequisites for companies to provide IPSO?

RQ3. Which is the major uncertainty factor in providing IPSO? Product, service, or customer?

RQ4. How can potential customer value be formalized depending on customer uncertainty/risk and company offer?

RQ5. How do companies address customer uncertainty at present during their planning/design and how do companies wish to address them?

RQ6. What is a good way to support companies to address customer uncertainty with IPSO during their planning/design?

RQ7. What are the incentives for customers of buying IPSO instead of physical products?

RQ8. How are IPSO accepted on the market by customers?

The three options in RQ3 i.e. product, service, and customer are raised through inspiration by the three important dimensions for designing PSS identified in [17], which are offer, customer, and provider. Definition for some of the terms used in the questions and the dialogue during the interviews is as follows. The categorization of the services, i.e. product-oriented service, use-oriented service, and result-oriented service, is adopted from [6].

- ◆ **Uncertainty:** state of deficiency of information related to a future event
- ◆ **Risk:** negative effect of uncertainty on objectives. Risk can be expressed in terms of a combination of the consequences of an event and their likelihood.
- ◆ **Opportunity:** positive effect of uncertainty on objectives.
- ◆ **Product-sales typed contract:** a contract in which a company sells a physical product to a customer with a fixed period of quality guarantee without any extra price.
- ◆ **Product-oriented service:** extra service provided in addition to sales of product. E.g. supply of consumables, maintenance, financing, take-back, and advice on product usage. This is labelled type a. in this paper.
- ◆ **Use-oriented service:** product leasing/renting/sharing (without ownership transfer) and pay-per-service unit (e.g. contract for using a copier). This is labelled type b.
- ◆ **Result-oriented service:** activity management service (e.g. office cleaning service and catering) and providing functional result (e.g. keeping harvest losses to an agreed minimum level). This is labelled type c.

4 PROVIDERS' PERSPECTIVES

To answer to the questions regarding the providers' perspective, nine companies were selected from large-sized manufacturers in Sweden who are interested in providing IPSO. A semi-structured approach with those questions above in mind was adopted for the visiting (face to face) interview except for one (done via telephone). The results are summarized in Tables 1 and 2. The rest of this section explains only three Companies C, E, and H in more detail due to the constraint of space. It should be noted that further description of companies themselves is not given, since it risks the identification of one of large companies in Sweden.

4.1 Company C

Company C provides industrial machines which consume a lot of energy at their usage phase. About 75% of the total cost beard by customers is in general energy cost. The cost of the customer, importantly, could be reduced by 30-40% through efforts of the provider. This is critical for Company C to be successful in IPSO business.

1. Needs

Company C aims to reach a win-win situation (higher availability/less cost on the customer and higher profit on the company) together with the customer (e.g. by applying the company's knowledge). They wish to enlarge the types of services; from a. Product-oriented services to include more from b. Use-oriented services and c. Result-oriented services. At the same time, they are interested in including as various contents in their offerings as possible. However, an operator (human) is not needed to be sent from Company C to the customer site, since only software works for operation.

2. Challenges

One of the biggest challenges to sell b. Use-oriented and c. Result-oriented services is finding a good way of convincing customers including pricing (payment). Initial investment, if needed, might make obstacle for customers, even though the saving to be obtained exceeds the investment after the pay-back time. In addition, customers often like to take prices originating from cost-based calculation by the company (i.e. dislikes value-based prices) due to a psychological (mental) reason. How to break this mental obstacle is a key challenge. Furthermore, in some cases, there is contradiction among divisions within the customer company (e.g. maintenance division is not willing to accept maintenance services, since some employees in the division lose their jobs).

Another challenge is preparing the human resource efficiently. Preparing a service base only for Company C to be ready for services whose time of occurrence can not be forecasted is too expensive against the density of customers at present.

Third, their development process should be changed so that the opportunity/risk is evaluated before neither product nor service is fixed in terms of the specification. This process is wished to be carried out by people from the divisions of service development and marketing.

Last but not least, the mindset of the employees should be also changed, partially because the functions of the people at the customer company they recently have to face are different from before: They used to work with the technical divisions in most of the cases.

3. Uncertainty

Company C considers that uncertainty is among the critical issues associated with IPSO. In the case of c. Result-oriented service, uncertainty both for the company and the customer is the bottle neck to be provided. Among them, customer factors have the largest uncertainty.

Table 1. Summary of interview results (1/2)

		Company A	Company B	Company C	Company D	Company E
IPSO Business in general	Current ratio of contracts with services	2/3	1/2	40%	30%	20%
	Current types of services provided	Type a is provided.	Type a is major at present.	Type a is major at present, although they already started to provide types b and c.	Their service business is in most cases in types a and b.	Type a is major at present, and they already have several contracts in types b and c.
RQ1.	Wished situation on service types	They wish to begin the types b and c.	They wish to shift to the type b but not to c.	They wish to enlarge the types b and c.	They wish to increase type c.	They wish to increase both types b and c.
	Drivers of IPSO	N.A.	Economy for the company.	Economy for the company and the customer (win-win situation).	Market needs and differentiation with competitors.	N.A.
RQ2: Prerequisites for IPSO	Challenges of IPSO	Calculation of economic costs of the company.	Developing a system to support generation of offerings.	Convincing customers and reducing uncertainty. Preparing service capacity close to every customer.	The knowledge of their sales staffs on the benefits and identifying how to convince customers in the case of c. result-oriented service.	Identifying customer needs. Organizational structure and company culture.
		They regard all of ensured customer needs, high reliability of service and product functioning, and some insurance.	Having high reliability of service and product functioning. Access to customer's operation is also a prerequisite.	Having high reliability of service and product functioning.	Ensured customer need/order, and reliability of services and products.	Ensured customer need/order, services, and products.
RQ3: The major uncertainty with IPSO	Customers and services for the type b and c, respectively.	Customers and services for the type b and c, respectively.	Factors from customers (operation).	Factors from customers.	Factors from customers.	Factors from customers.
RQ4: Customer value of IPSO		N.A.	N.A.	Saving (economic) on customers including risk on customers.	N.A.	It varies much.
RQ5: How to address customer uncertainty	Current situation	N.A.	The opportunity/risk is evaluated, before neither product nor service is fixed.	Not in a formalized way, sometimes depending on the persons.	Neglecting quantitative uncertainty and taking representative numbers to calculate customer benefits.	Including demonstration in the period of "trial" service, whose risk is on the company.
	Wished situation	N.A.	They wish the service development section to be involved more in the process.	In a formalized way, leading to measurement and management.	N.A.	N.A.
RQ6: How to support planning IPSO		It is vital to address economic costs for the company and some other figures on usage at customers. It may be in a form of software.	Establishing a more rational procedure and a system by making use of their past experiences.	Providing a formalized procedure providing quantitative data of economy to be shared and managed by different divisions.	N.A.	N.A.
Main issues	Calculation of costs.	Calculation of costs.	Development of offerings.	Convincing customers. Establishing service bases.	Convincing customers. Improving skills of sales staff.	Negotiation with customers. Identifying customer needs.

Notes: N.A. means that the information was not obtained due to some constraints of the interviews (e.g. time).

Table 2. Summary of interview results (2/2)

	Company F	Company G	Company H	Company I
Current ratio of contracts with services	25%	1%	0% (nearly)	N.A.
Current types of services provided	Type a is major at present.	They look at possibilities to provide more services in general.	Only type a is provided at present.	Type a is major at present. They look at possibilities to provide types b and c.
Wished situation on service types	They wish to shift from type a to include more from b, but most probably not from c.	They are interested in starting type b.	They are interested in starting type c. They attempt to find new business models using services.	They are not sure, to enlarge types b and c.
Drivers of IPSO	Differentiation from competitors (esp. in developing countries).	Differentiation from competitors.	Increasing the company profits.	Differentiation from competitors, value creation and optimization of offers.
Challenges of IPSO	Internal agreement on how to provide the service offerings.	Dealing with good collaboration with existing dealers (i.e. service base).	Identifying their strategy on how to sell services, and, to do so, identifying the true customer needs.	Understanding the implication for the company.
RQ2: Prerequisites for IPSO	Ensured reliability of services and products in addition to customer need/order.	Proper involvement from (and control of) dealers (i.e. service base).	In case of the type a, all from customer, product, and service.	Having high reliability of service and product functioning. In case of type a, customer, product, and service in their order must be ensured. In cases of types b and c, service, customer, and product.
RQ3: The major uncertainty with IPSO	Factors from services.	Factors from services.	N.A.	Factors from services.
RQ4: Customer value of IPSO	N.A.	Convenience.	Productivity of customers.	Saving (time).
RQ5: How to address customer uncertainty	N.A.	N.A.	A certain tool is employed before neither product nor service is fixed.	Using qualitative tools like decision tree process.
	N.A.	N.A.	Integration with customers.	Improving the above.
RQ6: How to support planning IPSO	N.A.	N.A.	Pricing may be a key.	Identifying business case. Prioritization in terms of business potential, and resource requirement.
Main issues	Internal understanding of the meanings of IPSO.	Collaboration with dealers.	Identifying customer needs.	Internal understanding of the meanings of IPSO.

Notes: N.A. means that the information was not obtained due to some constraints of the interviews (e.g. time).

4. Risk/Opportunity

Company C regard the size of consequence of risk on customers as an indicator to how much customers are interested in buying c. Result-oriented services. Complexity of a provided system would be an indirect indicator.

4.2 Company E

Much experience of Company E includes the followings: There were actually some contracts in the form of leasing/renting (type b). However, they quit it due to the less attractiveness in terms of finance for the company. Currently, some independent dealers do leasing/renting only in the North American (not in the European) market, where end users wish more mobility. Another type of experience is that they stopped closing a contract in the form of "profit sharing", where the company's revenue is determined depending on the machine performance. The reason is the company E and the customer could not often agree with the quantitative level for the performance from the observed data.

1. Needs

They wish to increase both b. Use-oriented and c. Result-oriented services.

2. Challenges

A challenge is to identify customer needs depending on customer types as it varies so much among customers. Another is changing organizational structure and company culture.

3. Uncertainty

Since their physical products are quite reliable, major uncertainty in services of the types b. and c. is regarded to exist in customers.

4. Risk/Opportunity

To contribute to reduce the uncertainty of customers, they provide a "trial" period of several weeks. The company E takes the risk during the period so that they will make financial compensation in case the performance was not satisfactory to customers. This can be regarded as demonstration using the customer-specific hardware and conditions.

4.3 Company H

B2B business is 100%, and product-sales typed contracts are (nearly) 100%. They keep high margin now from the sales of physical products, which is a result of the high performance by their R&D activities. I.e. they are a price leader in their market. However, they have so far not found a good strategy to sell services.

Their knowledge is so powerful to increase the customer's productivity. E.g. 10-30 % of the customer's cost can be decreased by the company's knowledge. This big impact is striking if compared to the actual cost for customers to buy their products (e.g. only 2% of the total cost).

1. Needs

They are interested in starting the type c, and attempt to find new business models using services.

2. Challenges

The biggest challenge is identifying their strategy on how to sell services in a better way. To do so, they want to identify the true customer needs. In addition, they want to know how much it costs to provide products/services, for which they do not have any working forms like software at present.

3. Uncertainty

They find more risk than opportunity in the type c, and find the major uncertainty in type c from customers. This can be interpreted that the company find high risk in the shift of business model from product sales to service provision.

5. Development process

They wish to change the degree of adaptation of products for the IPSO, especially in the case of type c. At present, they do not adapt the physical products at all.

5 CUSTOMERS' PERSPECTIVES

To answer to the questions regarding the customer's perspective, a set of some 60 companies with whom one identical company provides IPSO was selected. The provider, called Company J, is a medium-sized company in Sweden. A semi-structured approach with the questions RQ 7 and 8 in mind was adopted for the interview. Customers included dealers and users in Sweden and Germany. The customers were randomly picked from the CRM system of the IPSO-providing company.

Company J is a part supplier that has adapted their product to be used in an IPSO. The provided offering is a combination of product and service that can be used for heavy machinery products (either for newly built products or for the aftermarket).

The reason to adopt this Swedish provider is that the company had found that there is much difference in how well the market accepts these new kinds of offers upon selling IPSO to their customers. Especially, the acceptance was much different between Swedish and German customers.

In this case it was found that the Swedish customers accepted the business approach of IPSO to a larger extent than the German market. As the research results show various reasons to why the customer acceptance is not as high in Germany as it is in Sweden. The following points summarize the most important reasons;

German market

- ◆ Much of the new IPSO solution can be solved by traditional methods more easily.
- ◆ The price experience of the new IPSO solution is mixed. Some customers say that it is cheaper than a traditional solution while other customers claim that it is much more expensive.
- ◆ The customers are not aware of the new IPSO solution.
- ◆ Some customers that are aware of the new IPSO solution refer to it as an "emergency solution".
- ◆ The customer finds it easy to use a well-functioning method/solution than scouting for alternatives.
- ◆ Traditional methods/solutions are considered better and the customer can do the traditional solution themselves.
- ◆ The incitements for the customers are very low to use the new IPSO solution.

Swedish market

- ◆ The new IPSO solution is directly considered as an alternative when that kind of service solution is needed since all customers know about the new IPSO solution.
- ◆ The new IPSO solution is seen as a less expensive solution by the customers.
- ◆ The new IPSO solution is much faster to implement than the traditional solutions.

To summarize, the new IPSO is more known and accepted on the Swedish market than on the German market. However, the costs for the new IPSO in comparison to

traditional solutions is not clear if it is preferable or not in comparison to traditional solutions. For a better market acceptance the IPSO provider needs to improve the incentives for their customers, especially on the German market.

6 DISCUSSION AND CONCLUSIONS

One of the major findings is that there is a difference in how providers view IPSO depending on the maturity of providers in IPSO business: Providers with much experience (Companies A, B, and C) recognize that the major uncertainty exists in customers, while the others (Companies D and E) consider their services are the most uncertain. Coherently with this, the matured providers raised convincing customers and changing themselves as their major challenges while the others consider understanding the meaning of IPSO business to them is their current challenge. What the latter wish to have is, for example, support to identify their business case with IPSO.

Another finding is that a company already with much business of IPSO (Company A) regards, indeed, uncertainty is a critical concept and they wish to have a quantitative tool used for them to design/develop IPSO.

How to prepare the service base with both economic efficiency and capacity for providing services is found to be a challenge in Companies C and G. In the case of Company G, it could be another possibility that a new organization under even more (or full) control from the Company G be established. One example form could be a showroom that functions as a marketing/advertisement or selling place as well in a shopping area in a big city (from the viewpoint of economic feasibility).

In order to reach a good customer acceptance IPSO provider needs to be more clear and conscious about the customer incentives. If the incentives for the customers are better understood then the customers would more likely choose to change to the IPSO solution.

In order to reach new markets with the IPSO they need to be marketed as reaching a win-win situation for the provider and especially for the customers. Company B have been successful in their IPSO marketing by clearly describing the customer benefits. The benefits could for example be; economy, risk reduction, reliability, time-effectiveness. The scales of these benefits (i.e. customer value and costs) are very much dependant on in which industry sector that the IPSO is provided in.

Regarding the prerequisites for IPSO, all of the reliability of products and services in addition to ensured customer demands were often raised. Two of the nine companies collaborate with other insurance companies, and one of them sometimes regards this as necessity.

Changing development processes of their offerings was proved to be a common challenge.

Thus, the research questions are answered to as follows in conclusion.

RQ1. What are major drivers/challenges for companies to provide IPSO?

A1. Drivers include differentiation from competitors due to increased competition, decreasing costs (occasionally, win-win situation between a provider and a customer), market needs, increasing profits, and improving company brand. On the other hand, challenges include convincing customers, improving a process to generate offerings, reducing uncertainty from customers, improving the skills of the sales staff and the organizational structure for an experienced company and understanding the meaning of IPSO for less-experienced companies. Challenges for firms regardless of their level of experience include facilitating the shift of employee mindset as well as developing good

collaboration intended for IPSO with existing dealers (i.e. service base).

RQ2. What are major prerequisites for companies to provide IPSO?

A2. Having both high reliability of service (incl. proper service base) and product functioning is a prerequisite in addition to ensured customer demands. This is common to almost all firms, although the orders varied from a firm to another.

RQ3. Which is the major uncertainty factor in providing IPSO? Product, service, or customer?

A3. Factors from customers are the major for more experienced companies, while services are the major for less experienced companies.

RQ4. How can potential customer value be formalized depending on customer uncertainty/risk and company offer?

A4. It is different among providers. It could be formalized as saving (on economy or time) on customers including risk based on the idea of value in use.

RQ5. How do companies address customer uncertainty at present during their planning/design and how do companies wish to address them?

A5. Some companies have tested tools for dynamic assessment of risks. However, it is not widespread in industries. Even a company with much experience does not address (quantitative and qualitative) uncertainty in a formalized way. "Trial" service was employed by some companies to demonstrate the service at the customer. Thus, there is a reasonable wish to obtain a formalized way leading to quantitative management of uncertainty.

RQ6. What is a good way to support companies to address customer uncertainty with IPSO during their planning/design?

A6. One way would be to adopt a formalized and quantitative tool (software) calculating economy of the provider and the customer using some data in the past. Such tool should address information of the usage of products at customers. This originates partially from interpretation of the interviews by the authors since sufficient spoken needs from the companies were not available. However, this is in line with the future research implication in another literature [17].

RQ7. What are the incentives for customers of buying IPSO instead of products?

A7. Customers find incentives such as economy and time-effectiveness as preferable for the IPSO solution. It is important to find win-win situations for the provider and the customers.

RQ8. How are IPSO accepted on the market by customers?

Customer incentives are not always clear. While some customers find the IPSO preferable from economic reasons another customer could have an opposite experience. The IPSO maturity on the market is important to achieve the preferable win-win situation.

Further immediate works include, first, continuing more interviews for providers and enriching/strengthening the answers to those research questions. After fixing the company needs and challenges, establishing a method and a tool to support designers in companies will be a next work. For this method/tool, the results from the interviews will be incorporated especially what kinds of inputs, factors, and outputs for evaluating risks/opportunities they are concerned of. This is already dealt in another paper from us [18].

Many of the findings of this research study is also in line with the IPSO challenges found when analysing a learning network of large companies in Sweden. These results are further described in detail in [19].

To reveal the uncertainty on the customer side, a method to analyse the customers activity cycles developed in the marketing field [20] as well as a method to design services by discovering customer risks developed in the engineering field [21] would be of suggestion. The tool will be implemented on computer software, whose advantage is handling quantitative data with more ease.

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