

# How to educate customers about industrial product service systems – the role of providing information

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## Abstract

So called industrial Product-Service Systems (IPS<sup>2</sup>) are of growing importance in today's globalized economies. As is the case with all kinds of innovative problem solutions, however, the potential of IPS<sup>2</sup> to solve specific problems needs to be recognized by customers. It is therefore necessary for suppliers to educate about this potential by informing about IPS<sup>2</sup>. As ill selected information provision might lead to rejection of IPS<sup>2</sup>, adequate information strategies need to be developed. These information strategies are the main focus of this contribution. We focus on necessary steps for developing information strategies, such as the generation of knowledge about individual markets and customers. Building on this, we then develop an information model containing possible information dimensions and highlight suitable information combinations for educating customers about IPS<sup>2</sup>. This model can be considered a toolbox for generating customized information strategies with regard to IPS<sup>2</sup>.

## Keywords

PSS information and training, information strategies, overcoming innovation barriers

## 1 INTRODUCTION

Industrial Product Service Systems (IPS<sup>2</sup>) could pose a solution to many problems of companies from developed industrial nations [1]. These companies are no longer able to profitably provide superior technological artefacts and complement these with product accompanying services to add value [2, 3]. Both products and added services are subject to imitation, the costs for research and development can often not be amortised owing to fierce competition on globalized markets [4]. Customized innovative product service bundles, such as IPS<sup>2</sup>, can provide the competitive edge that companies are looking for [1].

However, as is the case with all kinds of innovations, IPS<sup>2</sup> can be encompassed by severe barriers to adoption. These reside in perceived risk and uncertainty on the customer side which are caused by a lack of understanding and knowledge about the innovative IPS<sup>2</sup> solution. It is therefore crucial to identify ways of communicating IPS<sup>2</sup> benefits and potentials, in order to improve IPS<sup>2</sup> adoption.

This paper deals with strategies of informing about IPS<sup>2</sup>. We focus on necessary steps for developing information strategies, such as the generation of knowledge about individual markets and customers. Building on this, we then develop an information model containing possible information dimensions and highlight suitable information combinations for educating customers about IPS<sup>2</sup>. This model can be considered a toolbox for generating customized information strategies with regard to IPS<sup>2</sup>.

## 2 CLASSIFICATION OF INDUSTRIAL PRODUCT SERVICE SYSTEMS IN AN INNOVATION CONTEXT

### 2.1 Characteristics of Industrial Product Service Systems

The goal of offering IPS<sup>2</sup> is to establish a customer-supplier relationship which cannot be easily broken up by out-suppliers [4]. IPS<sup>2</sup> are stamped by an integrated and mutually determining process of planning, developing, provisioning, and using of goods and services [5]. This

integrated development of product-service mixes tailored to fit individual customers' needs can generate entirely new barriers to imitation, allowing a company more long-term competitive advantages [4].

When it comes to the configuration of a tailor-made problem solution for an individual customer, one inherent characteristic of IPS<sup>2</sup> is of utmost importance: the possibility of partially substituting product-based and services-based components. This allows for flexible adjustments of IPS<sup>2</sup> solutions along their life cycle [6]. Such flexibility can be made use of either when suppliers recognize the possibility of cutting costs or when customers' are faced with changing business conditions, e.g. owing to market dynamics [7].

### 2.2 Industrial Product Service Systems as Really New Products

IPS<sup>2</sup> can inherit all characteristics of very new innovations, so-called Really New Products (RNPs) [8-10]. As is the case with RNPs, IPS<sup>2</sup> are new problem solutions to existing customer problems. This is because of the integrated planning and developing of product and service components and the flexibility option which forms part of an IPS<sup>2</sup> offer.

In contrast to common combinations of products and services, these components cannot be evaluated separately. An IPS<sup>2</sup> solution can therefore not easily be categorized into existing solution categories. Rather, they form completely new categories. This is another main characteristic of RNPs [11].

The innovative character of IPS<sup>2</sup> stemming from focusing on customer problems and providing new combinations of products and services is one of the main reasons, why IPS<sup>2</sup> can pose a central factor for long-term company success. With IPS<sup>2</sup>, customers might be able to do something they have never been able to do before. This crucial role for company success is also characteristic for RNPs [8, 12-14].

As illustrated, IPS<sup>2</sup> possess the main characteristics of RNPs and can therefore be classified as such an

innovation. Problems of IPS<sup>2</sup> adoption are due to their being RNP and are discussed in the following.

### **2.3 Barriers to the adoption of Industrial Product Service Systems**

IPS<sup>2</sup> create entirely new solution categories, as shown in chapter 2.2. Customers are therefore faced with substantial difficulties when assessing IPS<sup>2</sup>, as no inferences about benefits and drawbacks can be made from other solutions of the same solution category.

These difficulties of understanding benefits and drawbacks of IPS<sup>2</sup> innovations result in high perceived risks and uncertainty on the customer side [10, 13, 15, 16], which are main reasons for innovation failure [10, 17]. The newer the IPS<sup>2</sup> solution is, the higher the potential barriers to adoption are going to be. This is due to the fact that the perceived complexity of IPS<sup>2</sup> solutions rises with their degree of newness [13, 18, 19].

Perceived complexity, in combination with the high degree of newness is also the reason why great cognitive effort is needed to understand IPS<sup>2</sup> [8]. This is another barrier to the adoption of IPS<sup>2</sup>, as individuals are cognitive misers [20, 21] possess only limited cognitive resources [20, 22] and therefore try to keep the cognitive effort as low as possible. If too much mental strain is caused by the evaluation of IPS<sup>2</sup>, this will have detrimental effects on their diffusion.

Against this background, marketing IPS<sup>2</sup> is a formidable challenge. Therefore, the marketing of IPS<sup>2</sup> is discussed in the following chapter.

## **3 MARKETING INDUSTRIAL PRODUCT SERVICE SYSTEMS**

### **3.1 The importance of stabilizing preferences**

Stability of customer preferences is especially important with regard to IPS<sup>2</sup> development. Throughout all stages, from idea generation for possible IPS<sup>2</sup> solutions to launching new IPS<sup>2</sup> in the market, a company's main goal needs to be customers' long term satisfaction [23]. To achieve this goal reliable customer feedback about their individual problems and wishes needs to be gathered. Without such feedback, true customer needs cannot be met by the IPS<sup>2</sup> developed. However, customers are often not aware of their true problems [24, 25], or do not know the true worth of a solution [26]. This is due to the fact that customers do not think in dimensions of problems, but rather in dimensions of currently known problem solutions, which already exist in the market [27]. However, if individuals cannot understand a new problem solution, no reliable preferences can be measured [28]. Consequently, when applying marketing research techniques to analyze customer feedback which triggers decisions for IPS<sup>2</sup> development, such forecasting methods are prone to fail [10]. When designing IPS<sup>2</sup> to meet requirements which do not actually correspond to customer needs, the market introduction of these IPS<sup>2</sup> will fail. Such a failure of market introduction can have devastating long term effects for the supplier company. This is because the quality of market introduction positively correlates with company success [29] as the biggest monetary losses occur during the market introduction phase [30].

Hence, stabilizing customer preferences to gather reliable customer feedback about the desired IPS<sup>2</sup> characteristics is important not only for the profitability of an IPS<sup>2</sup> and customer satisfaction, but it is also crucial for long-term company success. Stable preferences, however, depend on an adequate level of knowledge for innovative IPS<sup>2</sup>, which a supplier can only create by conveying information. An inadequate choice of the information to be conveyed in combination with a lack in understanding this information

are the two main barriers to build adequate preferences, which is why suppliers have to provide high quality information [22]. This is even more the case, as individuals do not chose between different solutions, but rather between different descriptions of solutions [31]. These descriptions then trigger the processing of knowledge and the building of preferences.

When dealing with the processing of knowledge research has often been based on categorization literature, whose main assumption is that product categories serve to organize knowledge rather than to make use of and apply knowledge [11, 32]. Customers might for example learn about a new laptop by categorizing it with existing laptops. As RNP by definition create new product categories, categorization cannot be applied [10]. Even consumers with expertise in the domain of RNP have difficulties understanding and appreciating the benefits of such products [33]. This is due to the conceptual distance separating RNP from previously encountered categories, which makes it extremely difficult for consumers to use prior knowledge to build their representations of these innovations [34]. As a consequence, customers need to form new knowledge structures for RNP [35].

Therefore, means of stabilizing preferences by conveying information warrant thorough investigation. The following chapter provides an introduction to the information topic, by dealing with prerequisites for successful information strategies.

### **3.2 Prerequisites for successful information strategies**

Customer specific information is often very costly. However, as soon as the company recognizes the potential to differentiate from competitors and to stabilize customer preferences, the information strategy will be implemented among its business strategies. The first step towards a specific information strategy therefore is to build up an awareness within the company of the importance of such a strategy. This forms the basis to put the concept into praxis and requires a process of changing one's own view [36].

The next step is to gather information about the customer, which is essential to fulfill the specific information demands. The company has to gain knowledge about the customer and deduce his needs and desires. Furthermore, uncertainties and risks perceived by the customers need to be identified. These uncertainties and risks, which arise with the complexity of IPS<sup>2</sup> [17] have to be anticipated by the company to meet the information needs of the customer [36]. Through these steps the company gets to know the present knowledge and preferences of a potential customer and is then able to develop an information package, which fits the customer. With this information package the customer can be informed strategically.

These connections are shown in Figure 1.

### **3.3 The importance of adequately informing about Industrial Product Service Systems**

As shown, informing about IPS<sup>2</sup> potentials is necessary for future IPS<sup>2</sup> success. Moreover, certain requirements such as the acquisition of knowledge about customers have to be met in order to allow for the development of information strategies. The next step on the way to suitably informing about IPS<sup>2</sup> is the selection of the right kind of information. To facilitate this choice process, relevant information dimensions are pointed out, aspects which need to be taken into consideration with regard to IPS<sup>2</sup> are highlighted.

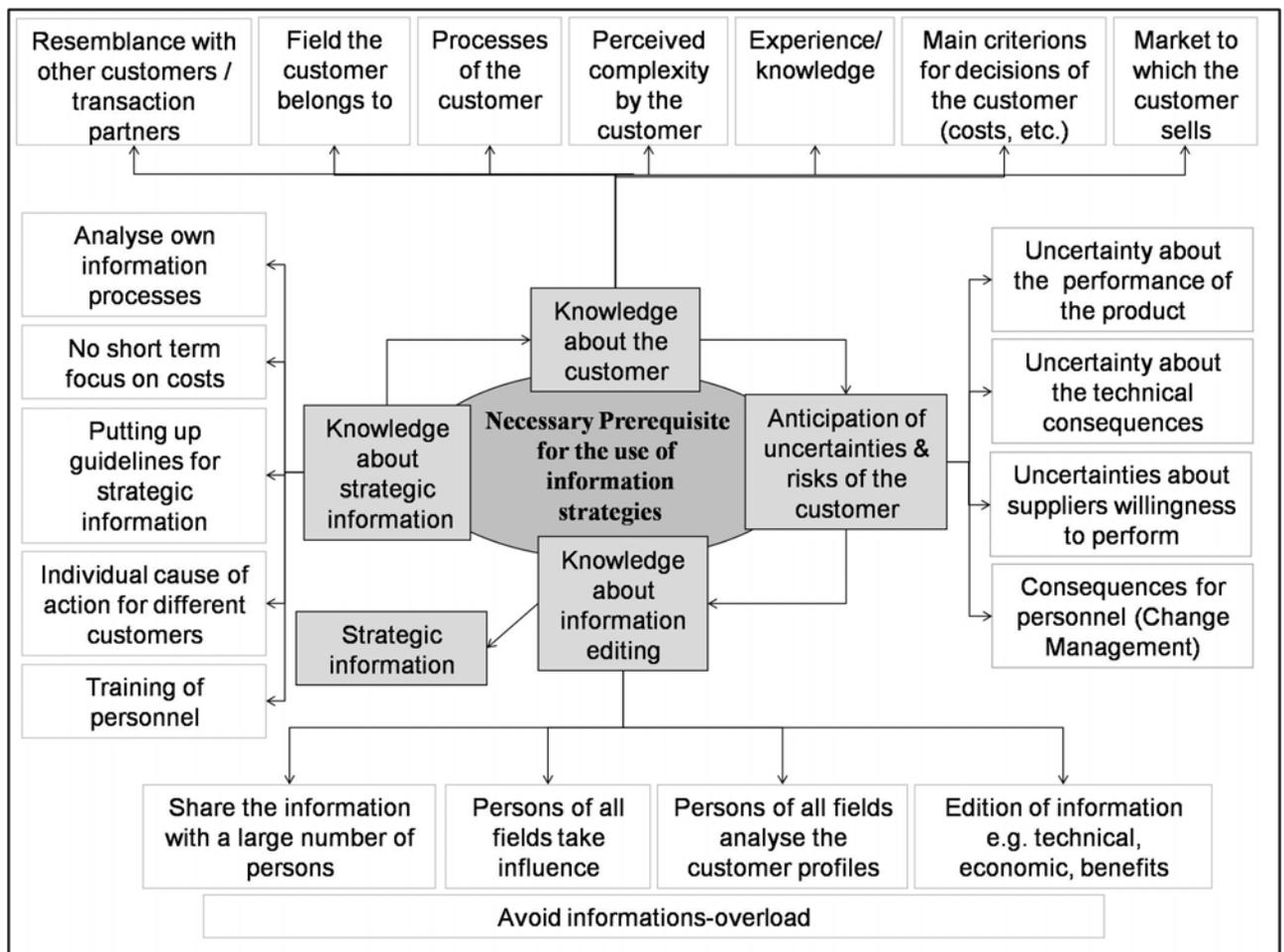


Figure 1: Strategic information

When marketing new solutions, which are sold to a customer for the first time, the amount of information which needs to be provided is higher than when marketing incrementally new solutions [37]. Furthermore, companies are generally tempted to provide the greatest possible amount of information to customers, with detrimental effects for customers' decision quality [9]. Hence, the first question companies need to find an answer to is how much information should be provided.

Another aspect which needs careful consideration is the aspect of information complexity and information detail. While explaining in detail all the aspects and technical features of a PSS might reduce the perceived risk of this PSS, it might also increase the perceived complexity and therewith strengthen barriers to IPS<sup>2</sup> adoption.

Against this background of perceived complexity and the cognitive strain going alongside with it, information dimensions need to be build alongside two dimensions:

processing information and processing tools. These are explained in the following.

#### *Processing tools as parts of information strategies for IPS<sup>2</sup>*

Processing tools facilitate the understanding of the information provided. These tools are especially important for IPS<sup>2</sup>, as the potential high degree of newness and complexity of IPS<sup>2</sup> increases the cognitive strain associated with understanding these solutions. Processing tools can help alleviate this strain.

Two different kinds of processing tools are promising with regard to IPS<sup>2</sup>, *analogies* [see e. g. 10, 11, 34, 38] and *mental simulations* [see e.g. 10, 39-42]. As Hoefler (2003)

[10] argues, both techniques stabilize preferences by reducing uncertainty.

In an analogy, information from a familiar domain (the base) is used to understand a novel domain (the target) [34]. New benefits may be learned through analogies to other products that provide similar benefits in another domain [11]. As an example El Houssi, Morel and Hultink (2005) [38] explained the use of the SmartPen (target), a device which biometrically identifies its user, by comparing it to a fingerprint (base).

A mental simulation, by contrast, is the imitative mental representation of an event or a series of events [41]. Customers, who are interested in buying a chainsaw might for example be told to imagine how to use and where to store it. Aspects they might previously not have considered, such as the need for sufficient space to store the chainsaw, can be stimulated by creating such mental representations of future events. The use of mental simulations is well established as a cognitive tool for making product evaluations and product adoption decisions and help customers learn about RNP [14, 43, 44]. Such visual processing mechanisms enable customers to imagine a product purchase, simulate a product experience, and to understand better the consequences of product usage [14, 44].

Hence, suppliers are faced with the question of whether and to what extend to use analogies and mental simulations when informing about IPS<sup>2</sup>.

### *Processing information as part of information strategies for IPS<sup>2</sup>*

Processing information deals with question of which kind of information to provide to customers. One can generally distinguish two different kinds of knowledge about innovative solutions, how-to-knowledge and principles knowledge [24, 45]. How-to-knowledge deals with the question of how an innovative IPS<sup>2</sup> works. It consists of information which customers need to be provided with to be able to use an innovation [24, 45]. Relevant aspects of how-to-knowledge are, amongst others, the quantity of innovation to secure and ways of using the innovation. The higher the complexity of the focal innovation is, the greater the amount of how-to-knowledge needed is going to be. When an adequate level of how-to-knowledge is not being provided, the innovation is likely to be rejected [24].

Principles-knowledge deals with the question of why an innovative IPS<sup>2</sup> works. It consists of the functioning principles underlying an innovation. Although it is usually possible to adopt an innovation without having any principles-knowledge, the danger of misusing the innovation is greater in this case [24]. Moreover, principles-knowledge should be of special importance in industrial goods markets, where only a complete understanding of the solution provided can enable customers to see how value can be created by using this solution and how problems can be solved.

Hence, IPS<sup>2</sup> suppliers are faced with the question of how much how-to-knowledge and how much principles-knowledge to provide to customers.

#### **4 DEVELOPING AN INFORMATION TOOLBOX**

In sales literature two dominant types of selling strategies are discussed, benefit selling and character selling. Using benefit selling means to inform the customer about the benefits which are connected with the different features of the product [46, 47]. In contrary to this character selling or feature selling means to concentrate on the features of the product and less on the benefits [46, 47]. As shown in a sales context customers are more susceptible to benefit selling [47].

When informing about RNP in general and specifically about IPS<sup>2</sup>, companies must also decide which information should be delivered. The company can give information about the benefits which the IPS<sup>2</sup> provides to the customer, or about technical features. Giving benefit information to the customer seems to be quite suitable, as RNP deliver new benefits to customers. The customer is able to do something which he was never able to do before [8, 14]. For a successful adoption of the innovation it is necessary that customers understand how new benefits meet their needs [48]. But as customers often fail to recognize these benefits it is essential to communicate them and therefore use benefit information.

Technical information about the RNP might also be provided to customers. RNP do not only offer new benefits, but mostly do this by using a new technology [9], especially in case of IPS<sup>2</sup>. The more complex a product is from a technical point of view, the higher are the perceived risk and uncertainty on the customer side which result from the incompetence to evaluate the technical features [15]. The customer is not able to value the performance of the product [26]. If the company succeeds in giving technical information to customers through which they understand the product, the perceived complexity and consequently also the perceived risk are diminished. Therewith, adoption barriers are reduced and customers are enabled to form stable preferences. But on the other hand there is evidence in literature that quantitative information is difficult to understand and to elaborate for

individuals [49-51]. As technical information is often quantitative in nature it could make the evaluation task more complex, possibly too complex to create stable preferences. Anderson and Jolson 1980 [49] even show that as the technical level of an advertisement rises, readers perceive the product more difficult to operate.

These two possibilities of informing customers can be operationalized by the two different kinds of knowledge, how-to-knowledge and principles knowledge. As described in part 3.3 how-to-knowledge deals with the question of how an IPS<sup>2</sup> works, principles knowledge with the question of why it works. Consequently, how-to-knowledge informs the customer about the benefits which are connected with the IPS<sup>2</sup>, principles knowledge delivers technical information [24, 45]. To successfully adopt an RNP both types of knowledge are important, the delivery of how-to-knowledge is even inevitable for the adoption. As stated in 3.3, if an adequate level of how-to-knowledge is not provided, the innovation will probably be rejected [24]. Therefore the amount of the different kinds of information provided is an important factor.

One of the key aspects in information processing of individuals is the cognitive load the customer faces. Individuals only possess limited cognitive resources [20, 22], and as they are cognitive misers [20, 21] they are only willing to use a certain amount to process information. If too much information is delivered to a customer not all information is processed and the risk is very high, that important information is ignored. Additionally, the individual uses heuristics when facing information overload which are context dependent and do not lead to stable preferences [22, 52]. Therefore, the cognitive load is not only affected by the amount of information, but also by the information complexity and detail. On the other hand Backhaus and others state that in the case of selling new solutions to a customer the need of information is maximal, because the customers possess no previous knowledge [37]. Consequently the company is in an area of conflict between providing enough but not too much information.

To summarize, the dimensions of information which can be manipulated by the company are how-to-knowledge and principles knowledge, the amount of information, the detail of this information and the amount of quantitative values it contains. In addition to this the two processing tools explained in part 3.3 can be varied, mental simulations and analogies. The combination of these parameters which should be used depends on the degree of innovativeness / newness of the product. If a product is only incrementally new, the amount of information which must be given to the customer is relatively low. Customers should not have great difficulties understanding the product and therefore giving how-to-knowledge should be sufficient. The perceived complexity and the cognitive load are small. The higher the degree of innovativeness gets, the more important it is to deliver additional principles knowledge to explain the customer how the product works. Within this principles knowledge the company has to decide about the detail of the information and the amount of quantitative information. The higher the amount of principles knowledge is the higher is the perceived complexity and the cognitive load. As a high detail of information and a great amount of quantitative information also add to the cognitive load, these two should decline with the amount of principles knowledge given. Otherwise the individual will not be able to process the information properly.

Additionally, the cognitive load should be reduced by using the two processing tools mental simulation and analogies. If the cognitive load and consequently the

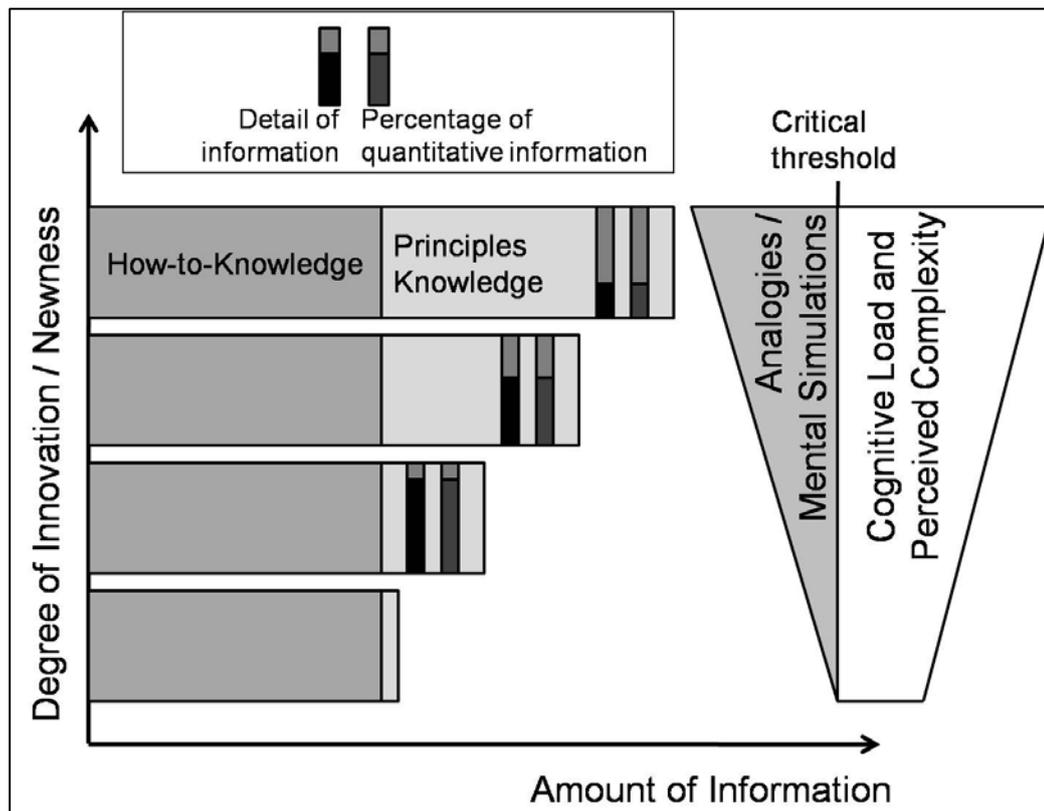


Figure 2: Information toolbox

perceived complexity increase over a critical threshold, the individual will not form stable preferences.

Therefore in case of highly innovative IPS<sup>2</sup> it is absolutely necessary to use these processing tools in addition to the given information, to enable the customer to process the information provided.

The explained connections are shown in Figure 2, which offers a helpful tool to plan customer specific information strategies.

## 5 CONCLUSION

As shown, IPS<sup>2</sup> could enable companies to satisfy customers' long term preferences and therewith to stay competitive in today's globalized economy. However, the potentially high degree of newness and complexity of IPS<sup>2</sup> leads to barriers to their adoption. To overcome those barriers, information strategies are needed.

This paper establishes a framework for such information strategies, which can be used as a basis for informing about IPS<sup>2</sup>. To do so, prerequisites for information strategies are highlighted and relevant information dimensions are explained.

While being a suitable tool to help companies develop information strategies for IPS<sup>2</sup>, our framework warrants empirical validation, e.g. through experimental testing.

Hence, further research will be build on our framework and provide such empirical validation.

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