

Strategies to reduce information asymmetry in Web Service Market

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Abstract

The web service model provides fundamental advantages compared to the classical software usage model. But transactions in the web service market have by far not reached the expected level. A reason for the tendency of market failure is the verifiable information asymmetry and uncertainty in the web service market. Besides deficiencies on the supply side, regarding configuration, display and communication of web service bundles, the limited web service knowledge of potential buyers are constitutional causes to the modest development and enforcement of the web service model. By the help of strategies derived from information economics the present study elaborates measures to take in order to prevent the market for web based services from failing.

The conclusions of an online-based questioning experiment offer strategic recommendations to reduce buyer's uncertainty in outsourcing decision. Results of the experiment point out the significant positive impact to reduce information asymmetry and transaction uncertainty in the web service market by integrating information substitutes in the web service bundle in order to transform experience and credence qualities into search qualities. It can be verified that web service customers have a higher willingness to pay when information substitutes are integrated into the web service bundle.

Keywords

Web Service, information asymmetry, information substitutes, outsourcing, application service provider, ASP, matching, web service market

1 Introduction

A multitude of advantages, that the web service model offers over the classical use of software, call for its deployment in practice. IT cost cuts, cost transparency, shorter times to implementation and installation, a reduction in capital investments as well as an improvement of the quality of services provide a convincing customer utility, especially for small and medium enterprises. By using the web service technology, organizations can outsource their IT department. From 1999 on, experts have been predicting an early success for the web service market. Still, current market analyses seem to prove that the utilization of a web services bundle has by far not reached the expected level.

The publications of Günther et al. (Günther et al. 2001, Günther & Tamm 2002) and Tamm et al. (2000) outline the results of substantial supply and demand analyses of the European web service market. As a conclusion, shortcomings in the configuration of the service bundles of web services as well as in the communication policy for the web services can be identified as the constitutive causes for the transaction uncertainty prevailing on the web service market. In addition, the web services users' limited rationality with regard to the knowledge about the web service model is depicted as a reason for their abstinence on the web service market. The authors could assess a need for information on the demand side that was not fulfilled by the communication policy of the web service vendors. Especially as far as performance characteristics are concerned, which are hard to assess for laypersons, such as data security, contract and pricing information, a lack of information is perceived on the demand side, hindering the decision in the favor of a web service. Still, an empirical analysis of the web service supply shows that especially relevant information for the decision are not pointed out transparently by the communication of most web services providers. According to the study, only nine percent of the web service vendors publish detailed information about the hosting of application software in the data center. Measures of performance as part of the contract information are pointed out transparently for only 17% of the web service bundles analyzed. Standardized Service Level Agreements (SLAs) are not provided for any of the bundles under consideration.

Potential users endowed with only little experience and knowledge about the web service model lack methods to assess the quality of web services supplied. The lack of transparency perceived with regard to the quality of the performance characteristics of the web services bundle and the providers of a web service as well as according to partners of the providers leads to an information asymmetry on the demand side, and thus to the small number of contracts placed.

The information asymmetries prevailing between the supply and the demand side do not only cause high transaction costs, but can ultimately even result in a complete market failure. Figure 1-1 relates and summarizes the main causes to the emergence of information asymmetries on the web service market.

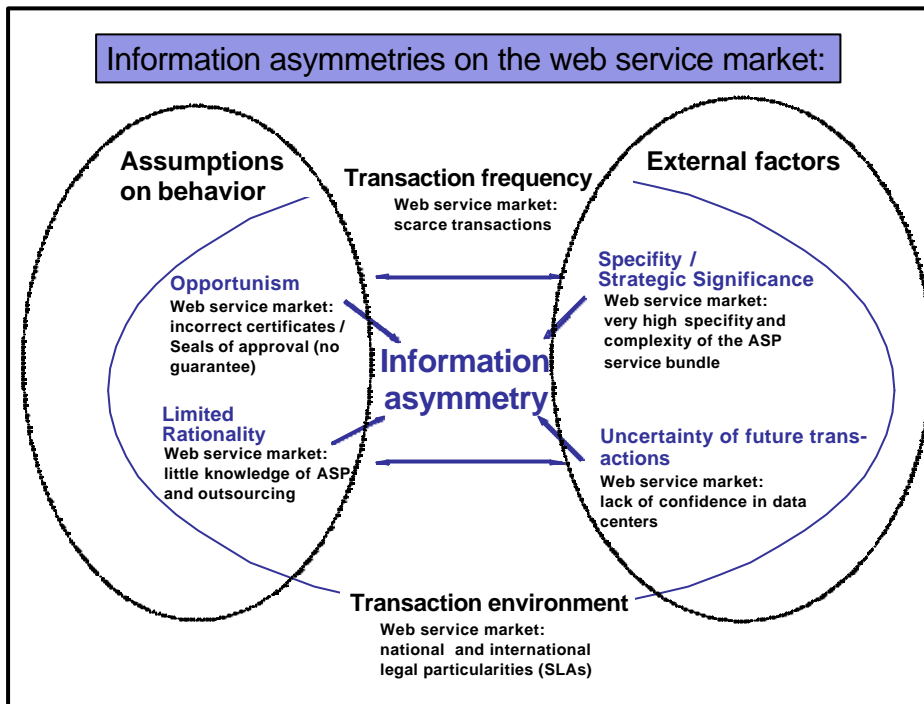


Figure 1-1: Influence factors of the information asymmetry on the web service market

The present study analyses the nature of the barriers hindering a positive development of the web service market from the viewpoint of information economics. The goal is to derive the measures that should be taken in order to prevent a market failure. Based on these considerations, strategies for a reduction of the information asymmetry on the web service market will be developed and verified by the results of an online-based questioning experiment.

2 Consideration of web based services from the viewpoint of information economics

As proven by the results of the publications mentioned above, the elimination of the lack of transparency and the reduction of uncertainty on the demand side are the basic requirements for the enforcement of the web service model. The following section uses information economics as a methodical approach for the scientific analysis of the information problems described above and for the development of strategies to overcome these problems. The theory of information economics is part of the new institutional economics. It is based on the idea of classifying the detectability of the quality of a product on the basis of the different consequences of information asymmetries. According to that, several strategies will be developed, aiming at a reduction of the classified types of uncertainties in the context of quality evaluation. The characteristics of the web service bundle are attributed to different information economics based types. Then, the strategies recommended shall be deployed in order to facilitate the quality evaluation and the perception of the characteristics of the web service bundle. The following section describes the fatal consequences likely to occur if the actors on the web service market do not succeed in reducing information asymmetries.

2.1 Information asymmetries and the theory of the „market for lemons“

It was no later than 1970 as Akerlof (1970) presented his scenario of the „markets for lemons“. His scenario outlines the mechanisms that sooner or later can lead markets with information asymmetries to the „worst-case-scenario“ of market failure, that is, to the situation where no transactions at all are conducted. As a tendencies to a market failure can be perceived on the web service market as well, triggered by information asymmetries, Akerlof's model of „lemon markets“ will in the following be applied to the web service market.

A web service market afflicted with information asymmetries provides incentives to supply a less than average quality at an average price, as the buyer cannot offhand observe and assess the quality of a web service's performance characteristics. As a consequence, when evaluating the quality, an average buyer assumes a distribution function over the different quality classes of a web service bundle. With regard to this probability distribution, the buyer assesses a given web service bundle according to the expected quality, corresponding to the average value of all web service bundles. Hence, his willingness to pay shall be guided by the price expected for an average quality bundle of services of a web service supplied. However, following this consideration, web service suppliers providing a web service bundle of higher-than-average quality shall never get an acceptable price offer from potential buyers. This leads to a systematic adverse selection of the contract partners. In the long run, the web service bundles of suppliers providing higher-than-average quality are no longer offered on this market in the long run. As a consequence, the average quality of web services available decreases, a phenomenon that buyers will also take into account for the quality distribution function they assume. Their willingness to pay shall decrease further and, as buyers will not either accept a transaction for their own disadvantages; no transactions will take place anymore. This is the scenario of market failure.

The scenario described above makes clear the consequences of an asymmetric information distribution between web service suppliers and buyers. Especially the phenomenon of hidden information must be considered in this context. Most of the causes for information asymmetry lie in the fact that the buyer does not know or cannot evaluate the characteristics of the service offered. As the buyers of web services are concerned about the competence of web service suppliers who are still unknown, and uncertain about the qualities of the web service bundle, their average willingness to pay decreases. The differences in performance, which are hardly assessable for an average buyer, make it difficult for the suppliers to differentiate their offer from that of their competitors. The following two chapters shall provide an answer to the question which informational measures (e.g. signaling) suppliers of high quality web service bundles can use to distinguish their products from dubious offers of minor value.

2.2 Quality of the Assessment of Characteristics in the Web Service Model

The quality of a service or a product is evaluated by reviewing each of its characteristics. As not all of these characteristics are equally easy to control, Nelson (1970), Darby and Karny (1973) distinguish three types of characteristics for assessing the ease of their evaluation: search, experience and credence qualities.

Search (or inspection) qualities are characteristics of goods whose presence or extent can be assessed before the use of these goods that is before contracting by a simple inspection of the good. Contrarily to that, experience qualities allow for an evaluation of the quality only during and after the use of the good. Credence qualities are those properties that even after the use of a good cannot be controlled at all or only at a very high cost.

Applying this classification to the characteristics of web service bundles, it becomes obvious that the latter are described by only a few pure search qualities (such as the area of usage, the language, the supplier and the price). On the contrary, the major part of the properties crucial for success (functional quality of the application, availability, performance and scalability) can be observed only when using the web service bundle. These properties must be considered as experience in a narrower sense. The control over the credence qualities of a web service bundle proves to be the most difficult (e.g. data security, indemnifications in the case of infringement of the contract). Following this measures the web service bundle can be positioned in the information economics triangle. Figure 2-1 shows that web service bundles are characterized for the most part by experience qualities, for a medium part by credence qualities and only for a very small part by search qualities.

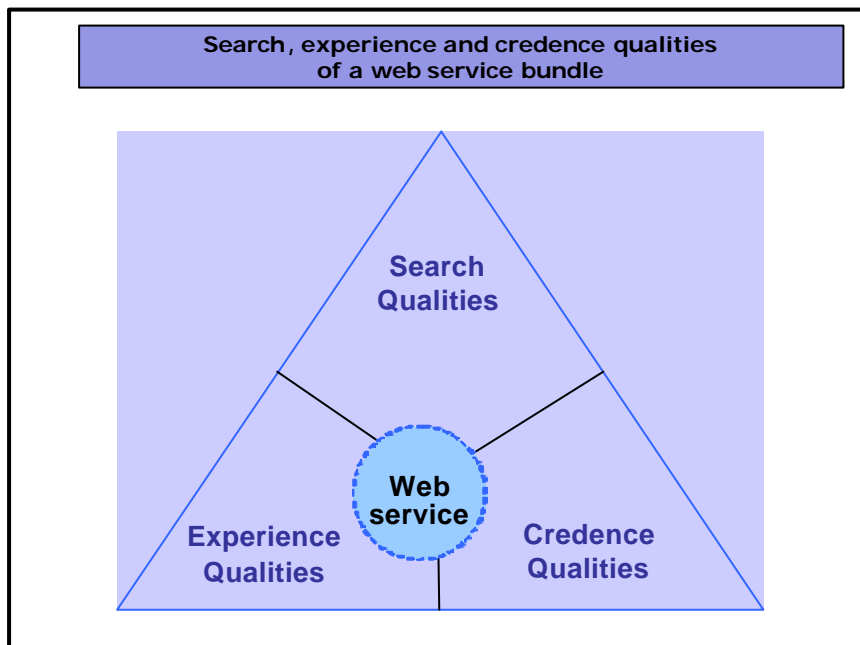


Figure 2-1: Search, experience and credence qualities of a web service bundle

3 Strategies to the reduction of information asymmetries

On the basis of these information economics based considerations, Weiber and Adler (1995a, p. 62 ff.) have developed appropriate strategies to deal with the classified information and uncertainty problems. They propose three strategic alternatives, differentiated by the way they cope with uncertainty. These strategies are then assigned to the quality types outlined above.

- Performance oriented information seeking
- Performance oriented information substitutes
- Comprehensive information substitutes.

The authors designate by performance oriented information seeking a direct search for information about performance properties that can be observed and assessed directly and with certainty before contracting. The greater the possibilities of evaluation are before contracting, the more appropriate this strategy proves to be for the reduction of uncertainty. Hence, from the viewpoint of information economics, it can be recommended only for search qualities.

If the search for information is impossible or would be too costly, information substitutes are employed. These are informing measures (signals) shortening the decision rule by combining and passing on the information in a way that makes it possible to view it as information of a higher value. Thus, information substitutes make decisions easier or at all possible. According to Ford, Smith and Swazy (1990, p. 435) information substitutes can help transforming experience and credence qualities into search qualities. The decisive factor for this proposition lies in the subjectivity of the informational qualities of the goods. Assigning each performance property to the group of search, experience or credence qualities can thus not be objective, as it depends on the subjective perception of the buyer. An expert judges a product in a different way than a neophyte would. Properties an expert considers as search qualities may be experience or credence qualities for the neophyte. Weiber and Adler (1995b, p. 99) conclude that the qualification of a property depends on the experiences of the buyer and on his ability to evaluate the good, as well as on situational variables.

As information substitutes involve a broad field of uncertainty strategies, a differentiated consideration according to information economics based criteria should be conducted. Information substitutes can be classified in the two types of „performance oriented“ and „comprehensive“ information substitutes.

Information substitutes related to concrete properties of the good are designated as performance oriented information substitutes. Examples of this kind of signals are warranties, seals of approval or test results. As far as experience qualities are concerned, the buyer can decide only after the use of web services if the service he received fulfils the properties assured by the supplier. Thus, the buyer should especially consider using performance oriented information substitutes for the reduction of uncertainty.

Consequently, in the context of a strategy of performance oriented information substitutes for the marketing of web service bundle, unobservable experience qualities (such as availability, performance and scalability) can be transformed into observable search qualities by giving the potential buyer a transparent access to certified seals of approval, warranties about service level agreements (SLAs), test or demo versions, or product evaluations by other customers even before contracting. Technological and economic measures of performance in the form of a contractual warranty (SLAs), that is, experience and credence qualities can thus be easily and efficiently converted into search qualities.

If, in addition to that, the potential buyers dispose of the possibility of ex post sanctions, that is, if a reputation mechanism is to be expected successful with the supplier, comprehensive information substitutes can be called in as a supplementary strategy for the reduction of uncertainty. As comprehensive information substitutes cannot be applied to concrete performance properties, they are of a rather global character and relate to the supplier and his position in the market. In this context, the supplier's reputation, the company's image, the name recognition, the prices or the spending on advertising are the central factors under consideration. The effectiveness of these factors is based on the possibility of corroding the welfare position of the supplier in the case of non-fulfillment observed after contracting. The supplier's reputation provides the buyer information composed of the accumulation and the diffusion of experiences that the potential buyer has not inevitably made himself. The basic idea with the use of information about a supplier's reputation is that the quality a supplier has

provided in the past will remain constant in the future. This leads to a situation of uncertainty for those suppliers having invested in their reputation by an outstanding product quality or by a high spending on advertising. As the suppliers attach some importance to maintaining the reputation premium gained from the investment, they have to assume dealing with an „expert buyer“. This expert buyer is not necessarily an individual buyer, but can also be represented by an institution, as for example UDDI. The „expert buyer“ is able to evaluate those properties that are perceived as credence qualities by common buyers and can thus corrode the reputation premium of the supplier in the case of a non-fulfillment, e.g. by propagating his negative judgment. Hence, a supplier with a good reputation has incentives to provide the quality he promises to inexperienced buyers as well. The result from using such a reputation mechanism is reflected in a fundamental reduction of the uncertainty about the trustworthiness of the supplier.

According to Weiber and Adler (1995a, p. 70), it is especially with credence qualities that the buyer is forced to trust the supplier as far as the fulfillment of his expectations is concerned. In this case, the use of comprehensive information substitutes consequently proves to be an appropriate strategy for reducing the transaction uncertainty before the purchase.

As web services are characterized by individual proportions of each of the three properties, a mix of the three strategies described above should be applied in order to raise the quality evaluation of products or services. Figure 3-1 summarizes the strategies for reducing uncertainty on the web service market and shows how the web service is perceived in the information economics triangle after the application of these strategies.

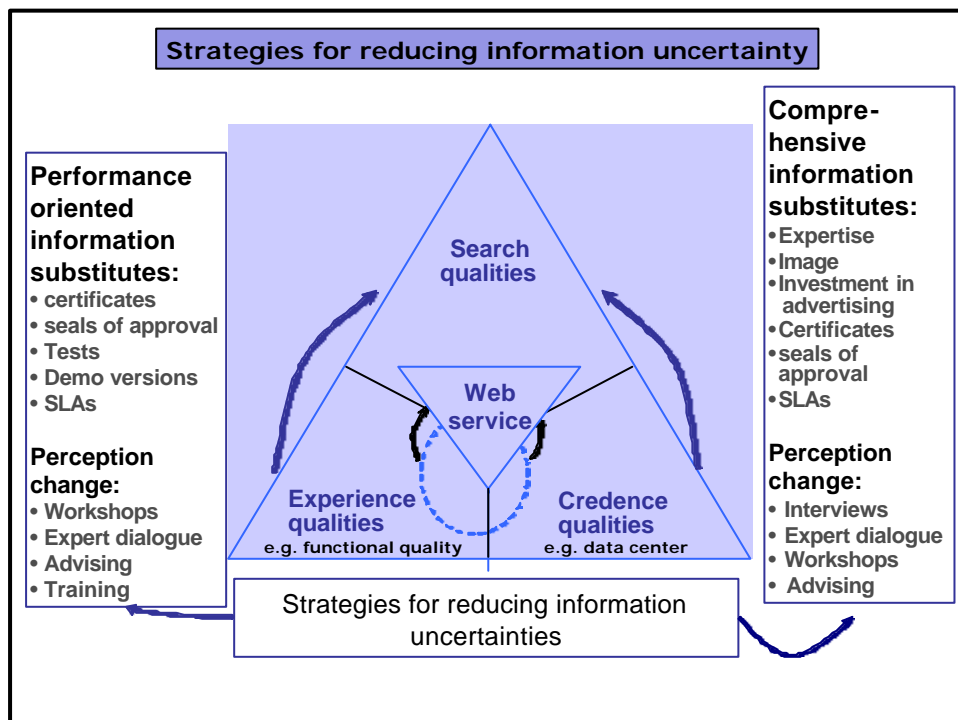


Figure 3-1: Strategies for reducing information uncertainty on the web service market

As a consequence, suppliers of web services can dramatically reduce the uncertainty about their services on the demand side by building up their brand, by investing in advertising as well as by propagating the quality and expertise they offer. Established organizations with an existing reputation and quality image will face much less difficulties than unknown companies to inspire confidence to the customers.

After the application of the strategy mix, the potential buyer views the properties of the bundle of services of the web service as composed for a larger part of observable search qualities, which are easier to verify. Still, it should be pointed out that uncertainty resulting from experience and credence qualities can be dramatically reduced, but not eliminated completely.

The following section of this paper shall describe in detail the appropriate forms of information substitutes for web services and investigate their consequences on the buyers of web services by the means of an online-based questioning experiment.

4 Experiment: Awareness and willingness to pay for Information substitutes in web services bundles

As shown in Chapter 2.1, performance oriented and comprehensive information substitutes form the root of the strategies to the reduction of information asymmetry (see chapter 3). The goal of strategies for reducing information asymmetries is to transform experience and credence qualities into search qualities. For purposes of the online-based questioning experiment, the following information substitutes were identified and chosen: evaluation by customers respectively by experts, warranties, seals of approval and certificates, demo version and the specification of reputations and references.

The following questions can be derived for the questioning experiment:

Questions:

Do buyers of web services perceive information substitutes?

Is it possible to prove an increased willingness to pay for information substitutes as part of web service bundle?

Should suppliers of web services and operators of web service marketplaces integrate information substitutes into the bundle of services of a web service?

The following chief hypothesis for questioning experiment is derived from the totality of the questions conceivable.

Hypothesis:

Buyers of web services do not perceive information substitutes?

4.1 Design and methods of the experiment

The main investigation of the experiment was to answer the question if the integration of information substitutes into the service bundle was reflected in the subjective perception of the consumers, and to which extent substitutes influence the willingness to pay for the whole service bundle. The internet environment that served as a frame to the realization of the online-based questioning experiment consisted on the whole of two modules. In the first part, the willingness to pay for web service bundles with or without given information substitute was to be gathered. In the first part, the test persons were asked to indicate their individual willingness to pay for six different types of application software on a scale from €1.00 to €20.99 as a monthly fee for using the application software in the web service model. The same products were presented to both groups in the same order, but the products were presented

alternately with or without an information substitute. The configuration for the first part of the online-based questioning experiment is summarized in Figure 4-1. The second part was identical for both groups. The test persons evaluated the importance for all of the six information substitutes mentioned and declared the willingness to pay.

Assembly of experiment: Integration of information substitutes for web services						
Typ of web service	Office-application	Graphic-application	Game-application	Statistic-application	Antivirus-application	Collaboration application
Product and service description	Product and service description (details)	Product and service description (details)	Product and service description (details)	Product and service description (details)	Product and service description (details)	Product and service description (details)
GROUP 1	SUBSTITUT REPUTATION IMAGE	NO SUBSTITUT	SUBSTITUT CUSTOMER-EVALUATION	NO SUBSTITUT	SUBSTITUT WARRANTY	NO SUBSTITUT
GROUP 2	NO SUBSTITUT	SUBSTITUT CACHET	NO SUBSTITUT	SUBSTITUT EXPERT-EVALUATION	NO SUBSTITUT	SUBSTITUT DEMO ROOM
Willingness to pay (statement test person)	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product	€ 1-2,99 € 3-4,99 € 5-6,99 € 7-8,99 € 9-10,99 € 11-12,99 € 13-14,99 € 15-16,99 € 17-18,99 € 19-20,99 no interest in product

Figure 4-1: Configuration of the online-based questioning experiment – first part

The data collection was conducted in January and February 2002. On the whole, 222 test persons were acquired. To gain a qualified statement, two groups were established. In order to assure comparability, the two groups were asked to evaluate the same products, which for one of the groups were combined with an information substitute and for the other were presented without an information substitute. The group designated in the following as group 1 consisted of 116 test persons, the second group, designated as group 2, consisted of 106 test persons.

4.2 Willingness to pay for web services with, respectively without information substitutes

The substitutes integrated into the bundle of services of a web service to describe experience and credence qualities are the following: reputation (image), cachet, evaluation by customers and experts, warranties and access for testing purposes. Experience qualities for example can be transposed into the quality perception of a buyer before purchase by providing an access for testing purposes. Uncertainty of transactions due to the presence of credence qualities could be reduced by ensuring the purchase by the means of a warranty. Still the latter can also be transformed into search and information qualities by customers or experts evaluation or by seals of approval. The absolute differences in the willingness to pay for information substitutes between the two test groups (G1, G2) are represented in Figure 4-1. For all substitutes used in the experiment a significant increase in the mean value of the willingness to pay is observed after the integration of an information substitute. The standard deviation underlines the narrow respectively broad distribution around the mean value.

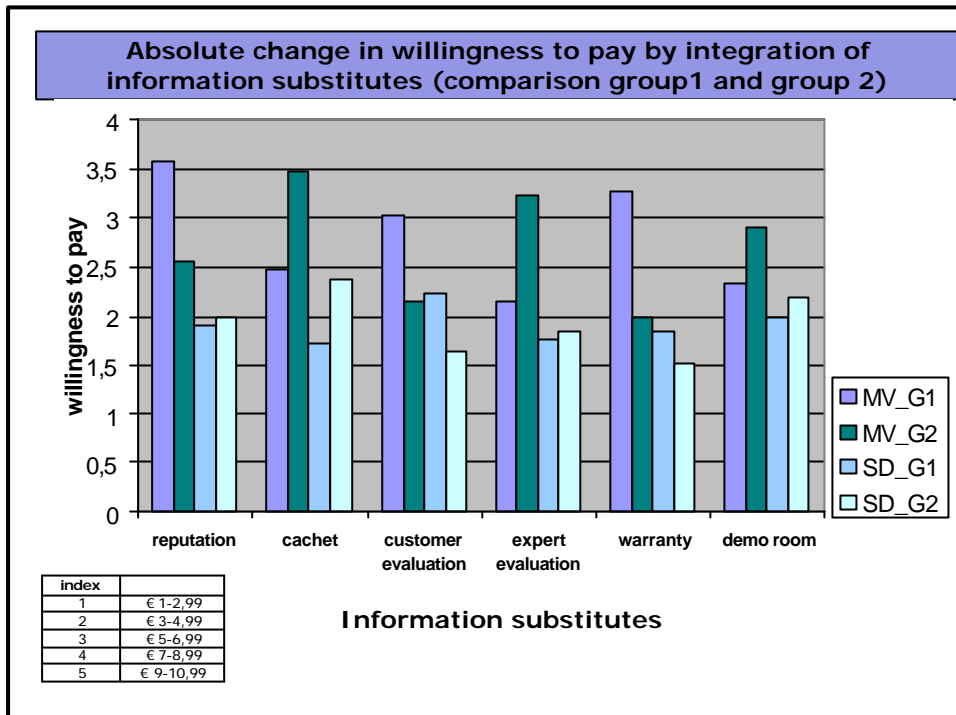


Figure 4-1: Absolute change in willingness to pay by the integration of information substitutes

For a comparison of the relative changes in the willingness to pay, Figure 4-2 relates a rank order of the information substitutes.

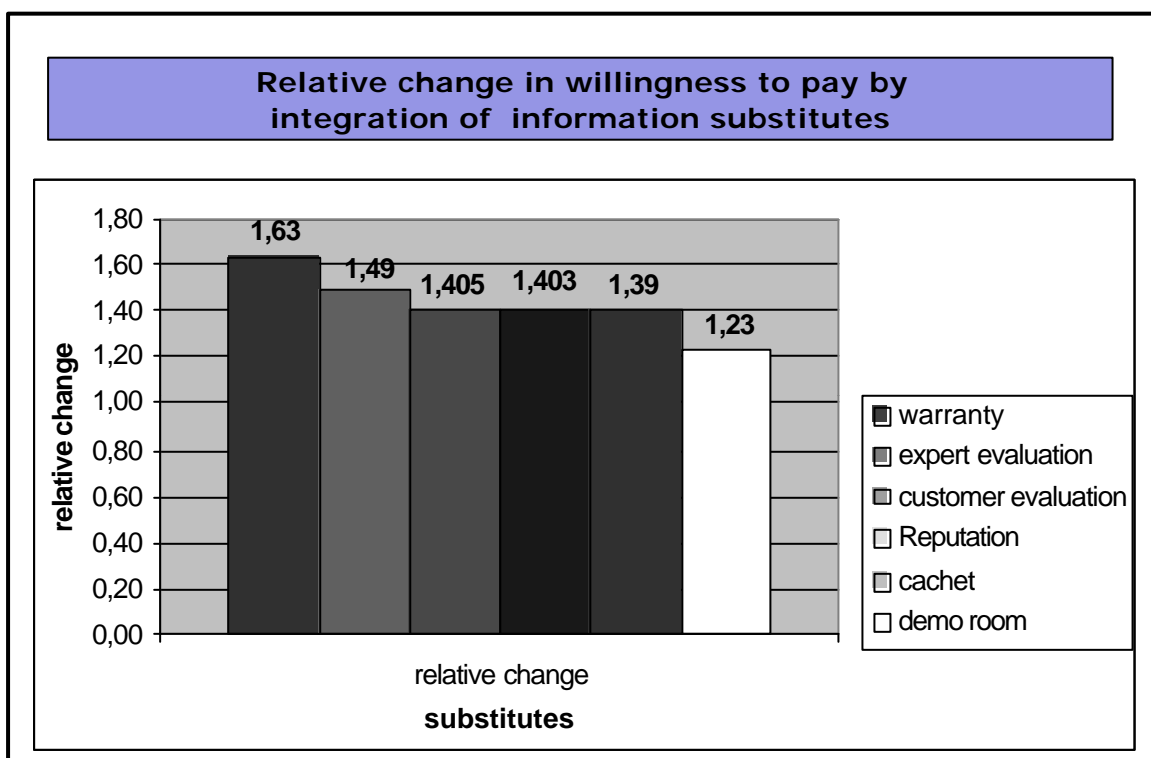


Figure 4-2: Relative changes in the willingness to pay by the integration of information substitutes

By far the largest relative change (162%) can be shown for the information substitute “warranty”. The integration of “expert evaluations” leads to the second largest relative change in the willingness to pay (149%). For the information substitutes “customer

evaluation”, “reputation” (image) and “cachet”, similar positive changes in the willingness to pay can be observed in the context of the experiment (139-140%). For the access for testing purposes (“demo room”), a positive change (123%) could analogously be shown. Except for the access for testing purposes, the results are significant with a five percent probability of error between the groups.

To sum up we can say that the integration of information substitutes into the service bundle of a web service leads to a positive change in the willingness to pay on the side of the buyers. The causes to the positive change in the willingness to pay may lie in the perceived reduction of transaction costs by information substitutes. The integration of a warranty (such as a Service Level Agreement) into the service bundle of a web service is the criteria the test persons honour the most.

4.3 Evaluation of the importance of information substitutes and of the willingness to pay

In the second of the questioning experiment all of the six substitutes were presented to the test persons for evaluation. Besides the evaluation of the importance, this part of the questionnaire was intended to gather the general willingness to pay for each of the substitutes. For the evaluation of the importance, the test persons were asked the question: „How important are the following product characteristics (substitutes) to you when purchasing a software product?“ The test persons could conduct the evaluation of the importance of each substitute (brand (reputation), cachet, customer and expert evaluation, warranty and access for testing purposes) by the means of an evaluation scale with six gradations from „not important at all“ (cipher 1) to „very important“ (cipher 6).

For the declaration of their willingness to pay for six different kinds of substitutes, the test persons were asked the following question: „Please state your willingness to pay for the following product characteristics (substitutes)!“ For the declaration of the willingness to pay for each substitute, the test persons disposed of a scale with six gradations reaching from a „very high willingness to pay“ (cipher 6) to „no willingness to pay“ (cipher 1). Figure 4-1 visualizes the results with regard to the rating of the importance of each substitute and the willingness to pay for it.

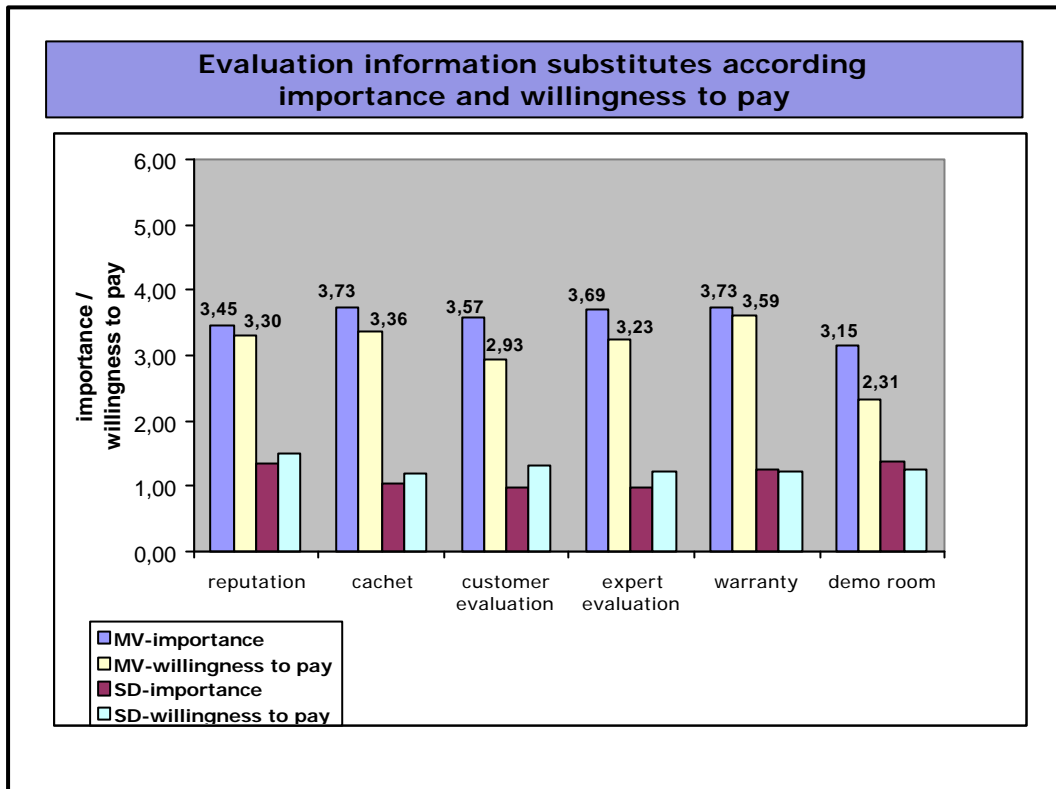


Figure 4-1: Evaluation of information substitutes with regard to importance and to the willingness

To sum up we can say that the test persons value the integration of information substitutes into the web service bundle on the average as important. Furthermore, in this part of the questionnaire experience a willingness to pay for information substitutes could be quantified. The detailed views in Figure 4-2 and Figure 4-3 show the between-subject-significance (Sign. Between) for the deviations within the groups as assessed through the one-factor analysis of variance in the column „Sign. Between“. As the significance values show, group specific effects cannot be proven with a sufficient significance that means that the evaluation was relatively constant between the two groups.

Typ	MV G1	MV G2	SD G1	SD G2	MV GESAMT	SD GESAMT	Sign. Between
Reputation (Image)	3,49	3,41	1,30	1,39	3,45	1,34	0,656
cachet	3,74	3,71	1,06	1,03	3,73	1,04	0,860
Customer evaluation	3,61	3,53	1,03	0,95	3,57	0,99	0,556
Expert evaluation	3,71	3,68	0,97	1,01	3,69	0,99	0,839
warranty	3,79	3,66	1,22	1,29	3,73	1,25	0,429
Demo room	3,10	3,19	1,35	1,43	3,15	1,38	0,640

Figure 4-2: Evaluation of the importance of each substitute – detailed view

Typ	MV G1	MV G2	SD G1	SD G2	MV GESAMT	SD GESAMT	Sign. Between
Reputation (Image)	3,35	3,24	1,50	1,48	3,30	1,49	0,570
cachet	3,32	3,42	1,19	1,18	3,36	1,19	0,530
Customer evaluation	2,80	3,08	1,36	1,29	2,93	1,34	0,124
Expert evaluation	3,15	3,33	1,32	1,16	3,23	1,25	0,298
warranty	3,58	3,60	1,26	1,24	3,59	1,24	0,928
Demo room	2,19	2,45	1,17	1,33	2,31	1,25	0,128

Figure 4-3: Evaluation of the willingness to pay for substitutes – detailed view

The results allow for the deduction of a rank order of the substitutes with regard to their importance and the willingness to pay for them. Figure 4-4 outlines the rank order with regard to the importance of the substitutes. Figure 4-5 shows the rank order of the substitutes with regard to the willingness to pay for them.

typ	appraisal	rank
warranty	3,73	1
Cachet	3,73	1
Expert evaluation	3,69	2
Customer evaluation	3,57	3
Reputation (Image)	3,45	4
Demo room	3,15	5

Figure 4-4: Rank order of the substitutes with regard to the importance of each substitute

typ	appraisal	rank
warranty	3,59	1
Cachet	3,36	2
Reputation (Image)	3,30	3
Expert evaluation	3,23	4
Customer evaluation	2,93	5
Demo room	2,31	6

Figure 4-5: Rank order of the substitutes according to the willingness to pay

The most important substitutes for the test persons prove to be „warranty“ and „cachets“. In addition to that, the test persons declared a higher willingness to pay for the warranty as compared to the cachet. This result especially points out potential buyers' high willingness to pay for services that are not only promised, but guaranteed to them. Suppliers of web services should therefore disclose the performance measures of the service bundle of their web service to the customer as soon as possible, drawing upon appropriate contract warranties (e.g. SLAs). In the same way, cachets and certificates (e.g. certificate of a data centre) should be integrated into the services bundle of a web service supplier. Analogously, representation of a partner network can be completed sensibly and efficiently by the integration of appropriate cachets and certificates of the partners. After the expert evaluation, the customer evaluation is classified as an important substitute. According to the assessment of the importance, substitutes „expert evaluation“ and „customer evaluation“ are higher-ranking as compared to „reputation“. Thus, suppliers of web services should display as soon as possible to their potential customers positive evaluations of the web service bundle set up by experts and regular customers. Contrasting with evaluation of the importance, the substitute „reputation“ shows a higher willingness to pay than the substitutes „expert evaluation“ and „customer evaluation“. Therefore, suppliers of web services should take into account that their service bundles and partner networks should show a brand reputation as high as possible, and, if

necessary, build it up consistently as a support to the integration of expert and customer evaluations. Access for testing purposes to application software is on average classified as important by the test persons. Still, in comparison to the other substitutes of the online-based questioning experiment, the demo room shows the lowest ranking with regard to the importance. The humble rank of the substitute „demo room“ is reflected even more visibly in the willingness to pay for this substitute. According to that, only a small fraction of potential web service customers are willing to pay for a demo room access. In respect of the positive evaluation with regard to the importance, suppliers of web services should take into consideration the integration of a free demo room access into their service bundle.

On the whole, the online-based questioning experiment could show in a significant way that the integration of information substitutes into the service bundle of a web service supplier is perceived by potential web service customers. The hypothesis set up at the beginning can thus be rejected. In addition to that, the experiment proved that information substitutes for experience and credence qualities of the web service model demonstrably do have a positive impact on the willingness to pay for the whole service bundle. By overall increase of price level the problem of adverse selection can be overcome because suppliers of higher-than-average quality are offered acceptable prices and therefore will not leave the market. In contrast suppliers of inferior quality will not be able to enforce excessive pricing. An essential requirement for this development is the efficiency of information substitutes. An information substitute is efficient when the costs for its generation are as high as it is not profitable for a supplier of inferior quality to integrate these signals into the web service bundle and contrary that it is relatively cost-efficient and consequently profitable for a supplier of superior quality to generate and include them. Suppliers of web services and of web service marketplaces should therefore integrate information substitutes into the web service bundle, as these substitutes demonstrably reduce information asymmetry and thereby prevail the web service market from failing.

5 Summary and outlook

Besides deficiencies on the supply side, regarding the configuration, the display and the communication of the web service bundle, the limited rationality of potential web service buyers with regard to the web service knowledge necessary for the evaluation of web services bundles supplied is a chief cause to the humble development and enforcement of the web service model. With the help of strategies derived from information economics the present study could elaborate measures to take in order to prevent the market for web based services from failing.

The online-based questioning experiment helped prove the significant positive impact on information asymmetry and transaction uncertainty of the use and consideration of information substitutes in the web service bundle. According to the experiment information substitutes for experience and credence qualities on the web service market are perceived by potential web service customers. The results of the online-based questioning experiment have shown that potential web service customers have a higher willingness to pay when information substitutes are integrated into the service bundle of the web service. Thus, information substitutes are an appropriate means for reducing information asymmetries and intransparencies prevailing on the web service market and for inspiring the necessary confidence to potential web service customers.

The results of the online-based questioning experiment can be helpful to the suppliers of web services and of web service marketplaces in the context of the configuration of their service

bundles as well as for the development of their communication policy. Established web services can be adapted to the requirements of the market on the basis of the strategies deducted above in order to reduce transaction uncertainty and information asymmetry. The implementation of recommended strategies will help web service buyers to evaluate web services and identify their advantages at an early stage in the buying process.

By enhancing the confidence of potential web service buyers in the web service model, the number of transactions conducted on the web service market will increase. Finally, the recommended strategies will help the web service model - that is, a new kind of software usage - to be widely accepted on the market.

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