

# WEB-BASED SERVICES: AN EMPIRICAL STUDY OF THEIR ADOPTION AND PENETRATION

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## ABSTRACT

*Application service providers (ASPs) and web services are becoming an increasingly popular alternative to selling software the traditional, “shrink-wrapped” way. This paper presents the results of an empirical study of the German ASP market. We surveyed a representative sample of companies traded on the German equivalent of Nasdaq. We asked questions about the companies’ expectations and practical experiences with ASP-based services. The results confirm that ASPs are definitely on the rise. However, several problems remain. Most potential customers are concerned about the confidential treatment of their data once it has been transferred to the ASP site. Quality of service and maintenance need to be agreed upon in advance, in contractual form. Finally, numerous potential customers have problems understanding the ASPs’ offerings in sufficient detail. A more transparent marketing, coupled with a more personalized sales approach, should be a major concern for the ASP industry as a whole. The results of our study should be of interest both to ASP companies, to help them improve their services, and to IT management as a whole to help them decide which (if any) of their enterprise functions would gain from using ASPs..*

## 2 THE APPLICATION SERVICE PROVIDER MODEL

**Definition Application Service Provider:** In this paper we follow the definition provided by IDC: “ASPs provide a contractual service offering to deploy, host, manage, and rent access to an application from a centrally managed facility. ASPs are responsible for either directly or indirectly providing all the specific activities and expertise aimed at managing a software application or set of applications.”<sup>1</sup>

In this definition, IDC is refining the term by naming defining characteristics such as *application centric*, *selling application access*, *centrally managed*, *one-to-many services*, and *delivering on the contract*. *Application centric*, *selling application access*, and *centrally managed* refer to the fact that the application is hosted (often by an ISP), that it is managed, and that the business model is based on selling access to this centralized service. The term *one-to-many services* refers to the fact that ASP applications are usually nearly identical for all users, providing for minimal customization. *Delivering*

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<sup>1</sup> Gillian, Clare M. (1999), The ASPs Impact on the IT Industry, an IDC wide opinion

on the contract refers to the responsibility of an ASP to ensure that the application service is provided as promised.

**The ASP value chain.** The ASP value chain, as shown in Figure 2.1, illustrates the initial position of different ASP players and their possible paths of integration. The x-axis defines all the components necessary to deliver an ASP solution and the y-axis shows the various players. This value chain can help to explore the many variations of ASPs and their business models. More importantly, it gives a good framework to estimate ASP market potential.

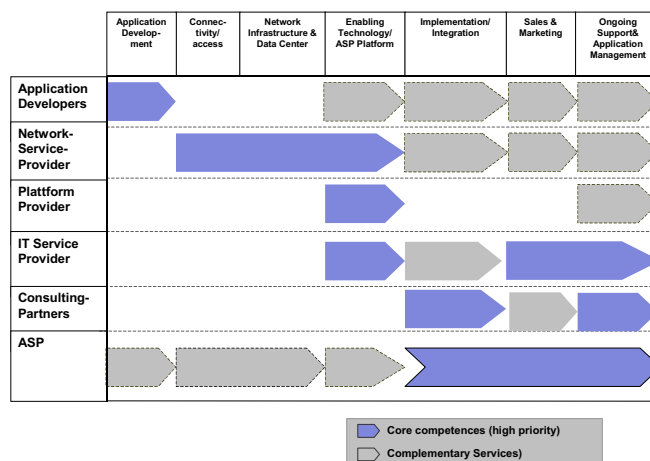


Figure 2.1: ASP value chain (According to Picot, Arnold (2000), p.47)<sup>2</sup>

### 3 DESIGN OF THE EMPIRICAL STUDY

**Objective.** The aims of this work are twofold: firstly it will draw a picture of the state of the art ASP model, its benefits and possible pitfalls for the customer. Secondly – and this is the main emphasis – it will analyze the results of a demand-side survey to gauge ASP awareness, adoption, preferences, and other trends. The analysis will provide an overview of the extent of ASP familiarity and use in Germany, it will discuss the main reservations and expectations of German IT managers about special ASP related subjects, and it will present the applications which are already being used, the applications which are likely and those which are unlikely to be used, and why. Further it will generate some suggestions for customers and suppliers as well. And last but not least it will compare its results with the outcome of studies performed previously.

**Methodology.** A questionnaire<sup>3</sup> seemed to be the obvious choice of instrument for this study. The questionnaire is structured in two main parts and consists of about 20 questions. The first part contains questions about the subject’s position and his/her tasks within the company, questions about the company’s size, core competencies, IT security measures, and experiences with IT outsourcing<sup>4</sup>. The last question of the first part relates to the subject’s familiarity with ASPs. The answer to this question determines which of five sets of questions will be presented to the subject in part two where opinions to, perceptions of, and possible experiences with the ASP model are being discussed.

**Implementation.** The data collection took place between January 9 and February 1, 2001. The companies given for the population of relevance were called and asked to take part in the survey. After giving approval, the questionnaire was sent via email to the appropriate addresses.

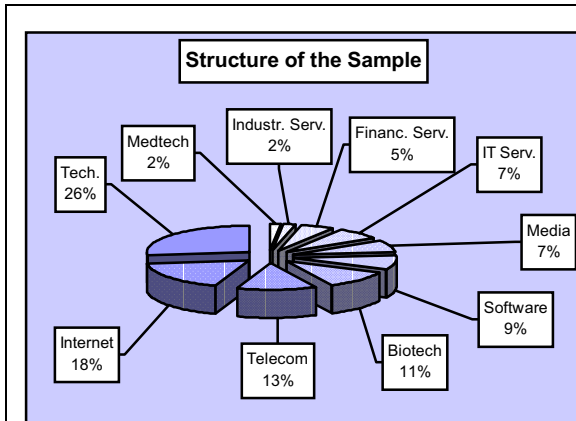
<sup>2</sup> Picot, Arnold (2000), Erfolgsfaktoren für Application Service Providing

<sup>3</sup> Mummendey, Hans Dieter (1995), Die Fragebogen-Methode

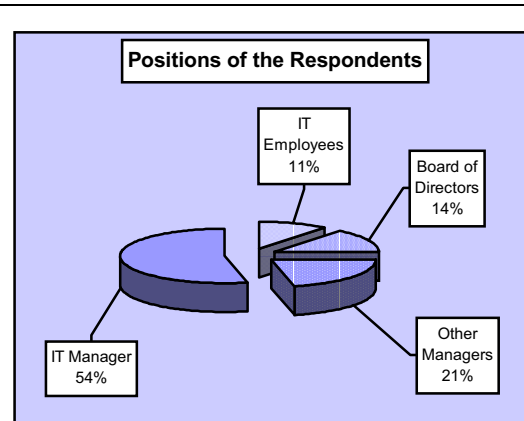
<sup>4</sup> Steffen, Günter (1999), Vom Outsourcing zum Application Service Provider

**Size and structure of the sample.** As population of relevance for that study, we chose the German companies of the German High-Tech Stock Exchange (“Neuer Markt,” the German version of NASDAQ). In January 2001 there were 271 companies quoted on Neuer Markt, divided into 10 different industrial sectors.<sup>5</sup> 56 companies took part in the survey. The sectors and the corresponding number of the companies are shown in Figure 3.1.

**Duties and position of the respondents.** More than 50% of the respondents are IT Managers responsible for planning, buying and running a company’s IT structure. Another 10% are members of the board of directors of their companies and about 20% are managers responsible for marketing, investor relations, product and business development and business units. Figure 3.2 depicts this distribution.



**Figure 3.1:** Relative frequency of the companies represented by their industry sectors; N=56



**Figure 3.2:** Relative frequency of the respondents' job categories; N=56

The high number of IT managers in the sample implies on the one hand that the subjects have been sufficiently familiar with the ASP concept. On the other hand it implies a bias, as pointed out by IDC<sup>6</sup> It was found that corporate executives perceive the ASP value proposition in a much more positive light than IT managers do. While IT managers see “all these technical problems,” corporate executives concentrate more on the ASP related business issues.

## 4 RESULTS AND DISCUSSION

### 4.1 Descriptive Data Analysis

For the analysis of the questionnaires<sup>7</sup>, we used SPSS (Superior Performing Software Systems)<sup>8</sup> The variables generated in the survey are primarily defined on an ordinal scale. Some are defined on a nominal scale and only two variables are defined on a ratio scale.

**ASP familiarity and use.** One of the most insightful results concerns the state of the awareness and use of the ASP model within the companies surveyed. The subjects were asked: “Have you already heard of application service providing and is your company already using application service providing?” After three years of massive press coverage of the ASP topic, more than 90% of the companies surveyed were familiar with the term and its meaning. About 60% of the companies were or are engaged in analyzing the possibilities of an application deployment via the ASP delivery model. Among these companies, one fifth are already using ASP solutions. 30%+ of all companies surveyed

<sup>5</sup> These sectors are defined from the German Stock Exchange; [www.neuer-markt.de](http://www.neuer-markt.de); (27.01.01)

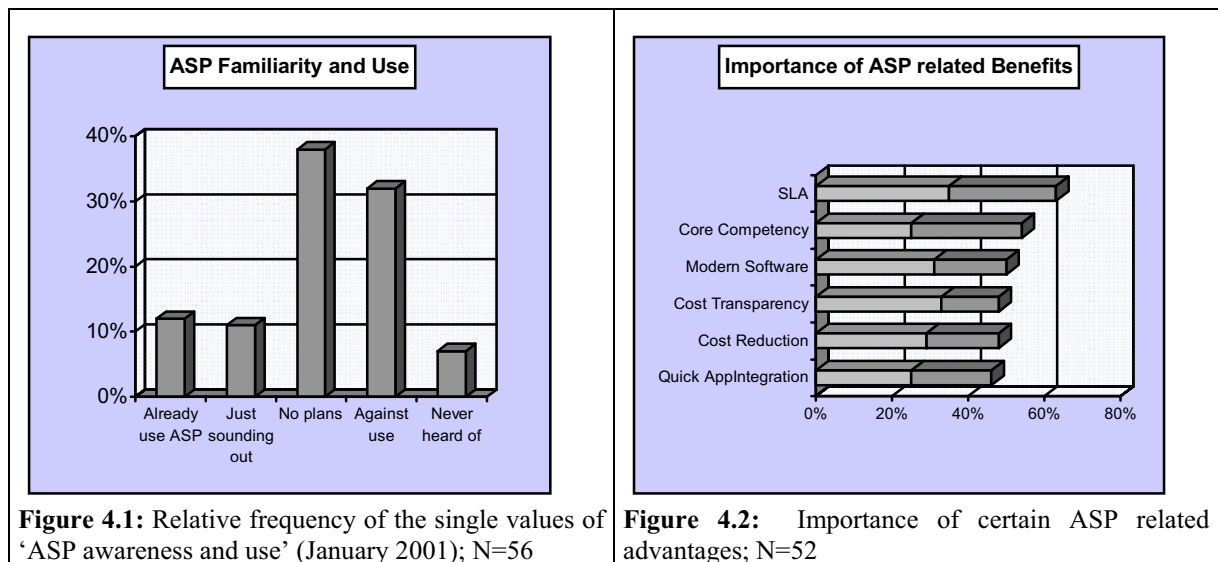
<sup>6</sup> Gillian, Clare M. (2000), Embracing ASPs or Not: IT Professionals Versus Corporate Executives

<sup>7</sup> Mummendey, Hans Dieter (1995), Die Fragebogen-Methode

<sup>8</sup> Kähler, Wolf-Michael (1998), SPSS für Windows

have already heard of ASP, but are not planning their use yet. Less than 10% claim to know nothing about the ASP model. A comparison of our results with the results of a study conducted by FORIT in December 1999 suggests a positive trend in ASP adoption.<sup>9</sup>

**Importance of ASP related benefits.** To find out how certain ASP related benefits are rated in importance, we asked: “How important are the following ASP related benefits? The following statistic shows the benefits and the appropriate relative frequency for the parameter values ‘very important’ (7 = dark gray in the diagram) and ‘quite important’ (6 = light gray in the diagram).



**Figure 4.1:** Relative frequency of the single values of ‘ASP awareness and use’ (January 2001); N=56

**Figure 4.2:** Importance of certain ASP related advantages; N=52

With over 60% approval rate, the guarantee of quality and service, as expressed by the *service level agreement* is perceived as the most important feature for using ASP solutions. The second important benefit (53%) is the wish to better “concentrate on the company’s core competencies” by using ASP solutions. With 50% approval rate, the ability to always use the most recent software is also weighted heavily. With slightly less than 50% of the votes, a possible “cost reduction”, and a higher “cost transparency” of an ASP solution are still regarded as important. This result is interesting in so far as the FORIT study identifies “general cost reductions” as the most important benefit of ASP use. In conclusion, all of the features are perceived as being at least “important”.

**Importance of ASP related problems.** To find out the respondents view of how important certain ASP related problems are, they were asked: “How important are the following ASP related problems? As a recent industry publication<sup>10</sup> states: “Security, performance and reliability are the three key considerations when a customer is evaluating the use of an ASP”. With close to 80%, “data security” clearly emerges as the most important concern regarding ASP solutions. The following statement of a respondent captures the current sentiments rather well: “In case of enough bandwidth, for smaller companies with a lower need for security the model is certainly attractive, but uninteresting for larger companies. Just the safety aspect will continue to prevent many companies to outsource relevant data and the corresponding applications.” With 60% of the entries, the financial stability of an ASP is rated as the second most important concern. That is clearly due to the immaturity and high volatility of the current ASP market, thus expressing companies’ concerns to be tied to an ASP that is at risk of insolvency. To ‘monitor’ compliance with the service level agreements is, with about 55% approval rating, the next important variable and shows the need to control the existing agreements.

<sup>9</sup> Forit. 2000. "Application Service Provider: Software via the Internet", Forit GmbH

<sup>10</sup> Corneil, Chad (2000)

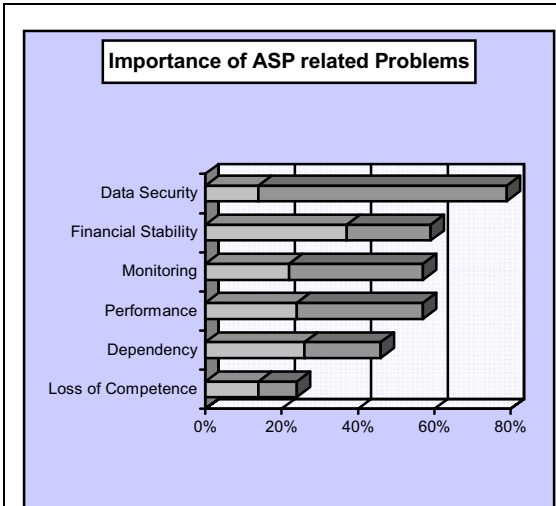


Figure 4.3: Importance of certain ASP related problems; N=51

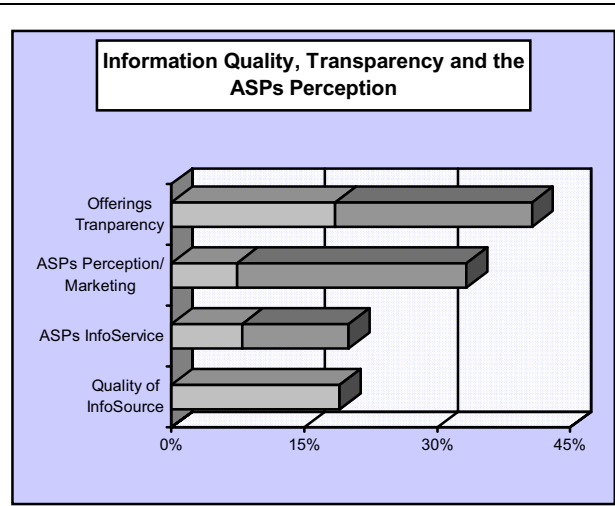


Figure 4.4: Evaluation of the variables ‘the offerings transparency’, ‘the perception of ASPs’, ‘ASPs information service’, and ‘information quality’; N=26

**Information quality, transparency, and the ASPs perception.** The respondents were asked: “How did you perceive the following attributes during your information gathering? Figure 4.4 shows a bar chart diagram for these variables and the parameter values 1=“absolutely insufficient” (dark gray in the chart) and 2=“quite insufficient” (light gray in the chart) were taken. The most striking outcome is, that over 40% of the respondents perceived the transparency of the ASPs offerings as insufficient. With 33% of the entries giving a negative evaluation, the ASPs’ marketing and general perception seems definitely insufficient. That means that in spite of the mentioned massive press coverage of the ASP topic, the single ASPs were not able to build up a sufficient brand identity. The quantity and the quality of the information found was, with 19% of the entries and with a median of four, assessed as neither sufficient nor insufficient.

**Demand for different ASP services.** The intention was to find out which kind of ASP services are the most popular (figure 4.5). The question was: “Which of the following possibilities of the ASP model would you like to use?”. Questioned were all those respondents who had declared to know the ASP model and who were open to ASP deployment.

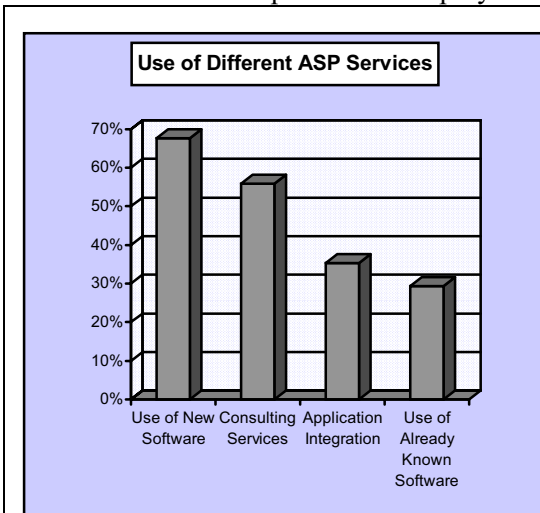


Figure 4.5: Relative frequency of ASP services respondents would be interested in; N=27

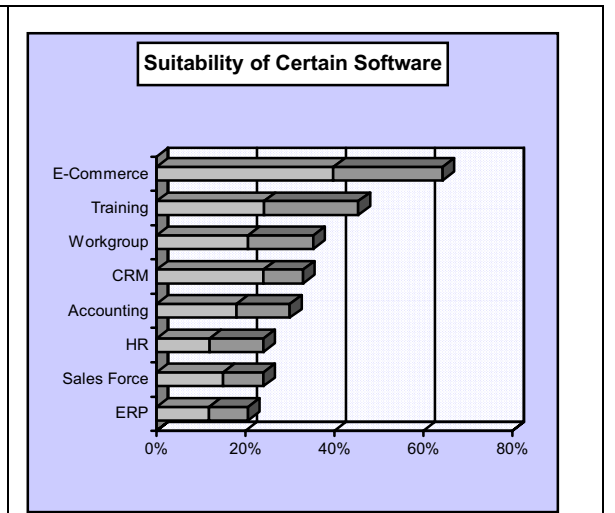


Figure 4.6: Evaluation of certain types of software applications in terms of their suitability for an ASP deployment; N=34

The main result is that fewer than 30% of the respondents are interested in moving an existing in-house software application to an ASP model. On the other hand, close to 70% of respondents would consider ASP for the deployment of *new* software. These findings are compatible with the desire to concentrate on the company's core competencies without reducing existing in-house competencies<sup>11</sup>. Only 35% of all respondents would integrate their application by an ASP. 55% of the respondents would take advantage of consulting by an ASP.

### **Suitability of applications**

To find out which types of software applications were perceived as most amenable to the ASP model, we asked: "Please evaluate the 'ASP suitability' of the following software applications (figure 4.6). E-commerce applications are regarded as the most suitable applications for deployment via the ASP model. About 65% of the respondents voted with 1 or 2 (Median=2). For around 45% of those questioned, training is also a well suited application for ASP. Even work group (or collaborative) applications with about 35% of the entries received a relatively high rating. Enterprise Resource Planning (ERP) solutions are only considered suitable by 21% of the respondents. All in all there is no application which was considered completely unsuitable for ASP deployment.

### **ASP's ability to fulfil the model's value propositions**

The aim of this section is to find out what those respondents whose companies do not or not yet deploy software via the ASP model think about ASP model's ability to meet their expectations. The question was: "Please evaluate the ASP model's ability to meet your expectations" Only 50% of all respondents rated the ability to deliver modern software as 'quite good' or 'very good'. 45% of the respondents believe that ASPs enable the company to gain a high degree of flexibility in terms of software usage and all related subjects. About 40% of the entries mentioned quick application integration. This indicates that most customers consider an ASP solution more appropriate for applications that are not overly complex. 37% of all respondents trust an ASP's ability to perform transparent billing and to enable their customers to better plan their expenses. 33% believe that ASPs generally meet the service level agreement. With only 20% of the entries and a median of four, the respondents question the ASP's ability to guarantee a sufficient level of data security. Even lower is the confidence in the ASP's ability to reduce IT costs and or to meet the level of performance met with in-house solutions.

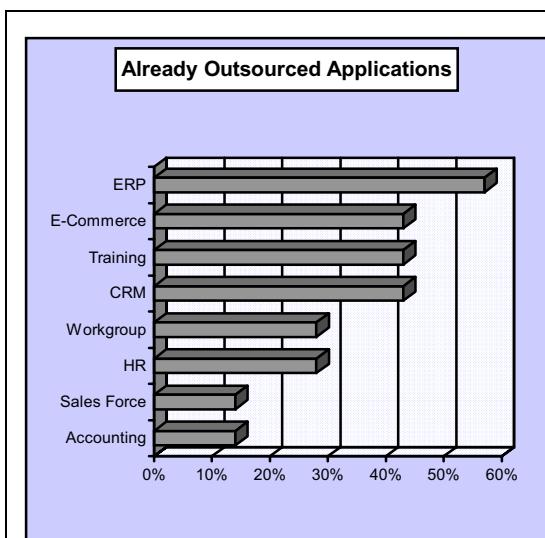
### **Software deployment via ASP**

In this section those respondents were questioned who already use the ASP model. The first question refers to the type of software application obtained: "Which of the following software do you deploy via ASP?". The results are graphically shown in Figure 4.7. As only 7 of 56 respondents already use the ASP model it is important to notice that the outcome has only informative character with insufficient statistical validity. Since the FORIT study also asked for already outsourced software applications, it is interesting to compare the results of both studies. Similar findings could increase the statistical validity. Four of the seven respondents outsourced ERP functionality. This high rate is in contradiction to the FORIT study, which reported that in the US just 2% of 104 users deployed ERP software, and in Germany no company used ERP software via ASP. On the other hand, our results are consistent with the FORIT study regarding the fact that e-commerce, staff training, and CRM (Customer Relationship Management) applications are the most favored applications delivered by ASPs. As shown in Figure 4.7, our study confirms these results.

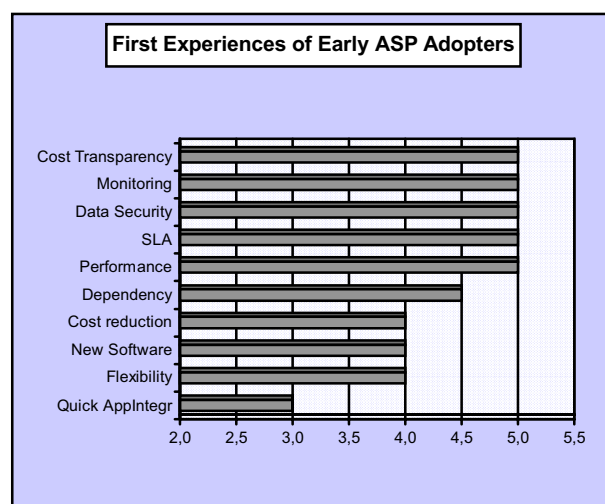
**Experiences with Application Service Providers.** To find out what kind of experiences the early ASP adopters have made up to now, they were asked: "Please give an account of your experiences with ASP solution deployment."

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<sup>11</sup> Gillian, Clare M. (2000), *Embracing ASPs or Not: IT Professionals Versus Corporate Executives*



**Figure 4.7:** The kind of applications being already used via ASP; N=7



**Figure 4.8:** Median for the variables ‘experiences already made’; N=7

Perceived as the most positive features, with a median of five, were ‘cost transparency’, ‘monitoring’, ‘performance’ and ‘data security’. The transparency of, and the possibility to better plan the costs which arise with a software deployment via ASP is perceived as a positive feature. Data security is also perceived as good, which is somewhat surprising given the skepticism that was expressed in answers to earlier questions. An interesting result is that three of seven respondents state there are slight or visible cost savings associated with deploying ASP solutions.

#### 4.2 Explorative data analysis

After analyzing the data with descriptive methods, now some explorative methods are used to analyse and verify certain statements frequently made in diverse articles. There is no agreement in the literature whether ASP popularity is correlated with company size. On the one hand, one frequently reads that the ASP model is well suited for small and medium sized companies with a high growth potential. Because large enterprises tend to have more in-house expertise, they are more likely to host and operate their own software. A study by The Philips Group, for example, says that larger companies with more than 2500 employees will account for 56% of the ASP market by 2004 (Table 4.1).

% of Large Enterprises Using ASP Services (Businesses with 500 to 100,000 employees)		
	Currently	2004
Internal Applications	19%	65%
E-Commerce	7%	72%
% of Small/Mid-sized Businesses Using ASP Services (Businesses with 20 to 499 employees)		
	Currently	2004
Internal Applications	31%	44%
E-Commerce	29%	53%

**Table 4.1:** Larger companies will account for the majority of ASP user by 2004

To find out which, if any, of these predictions can be verified for the given sample, the following hypothesis will be tested:

**H0: There is no correlation between the company size and ASP use:  $\rho=0$**

The variables used were ‘employees’ for the company size and the variable ‘ASP familiarity and use’. To test the original hypothesis, we use the Spearman coefficient of correlation. This coefficient does not assume variables to be normally distributed and also can be used for ordinal scaled and continuous variables.<sup>12</sup> Table 4.2 presents the statistics for the test of significance of correlation.

Correlation according with Spearman			
		Employees	ASP familiarity and use
Employees	Correlation	1	0.478
	Sig. (two-tailed)		0.001
ASP familiarity and use	Correlation	0.478	1
	Sig. (two-tailed)	0.001	

**Table 4.2:** Correlation between the two variables ‘employees’ and ‘ASP familiarity and use’; N=48

On a 1% significance level the hypothesis (H0:  $\rho=0$ ) has to be rejected. This means, that the calculated positive correlation between company size and ASP refusal is statistically significant. In other words the smaller the companies the more likely they are to adopt the ASP model. Supposing the ASP model is, as mentioned above, Pareto efficient, a different degree in adopting the ASP model would make no sense. So, either there are powerful external factors (economical or psychological) or for some companies the ASP model does really not offer a true advantage.

## 5 CONCLUSIONS

**Marketing and sales functions are crucial.** The success of the application service provider model will strongly depend on the marketing and sales activities of the ASP companies. ASPs should regard sales and marketing as their top priority.<sup>13</sup> First, with 33% of the entries giving a negative evaluation, the ASPs’ marketing and general perception are clearly perceived as insufficient. Second, given the ASPs position in the value chain, ASPs should act as the only point of contact to the end user. Thus they are able to contractually bundle the single components of the value chain in order to offer a complete solution.

**ASP adoption in Germany still relatively low.** With about 12% of the respondents already using ASPs and a further 11% investigating the possibilities of ASP use, ASP adoption in Germany is still relatively low, especially compared to the United States, where the degree of ASP adoption was about 75% at the end of 1999.

**Main reservations and expectations.** To generate some suggestions for better ASP marketing it is necessary to review the main reservations and expectations of the respondents. The ‘guarantee of quality and service’, as laid down in the service level agreements, was considered the most important benefit. The most concern was expressed about ‘data security’ issues. These insights, combined with the fact that respondents considered transparency of the ASPs’ offerings as insufficient, leads to a straightforward conclusion. ASPs need to describe in more detail what they are offering and how they are delivering it. Moreover, ASPs should make more use of their channel partners’ brands to emphasize their ability to deliver high quality. Finally, transparent billing is a good marketing tool that

<sup>12</sup> Martens, Jul (1999), p.157

<sup>13</sup> Picot, Arnold (2000 a), p.47

enables ASPs to version their service models to a larger extent and to comply with the end user's wish for cost transparency.<sup>14</sup>

**The ASP ability of software applications.** At this point, ASPs are most commonly used to deliver solutions for ERP, e-commerce, training, CRM, human resources, and work group support. These results correspond to the results of the FORIT study except for ERP, where FORIT reported a penetration well below the level we had observed. As for future ASP usage, most respondents favoured e-commerce implementation, such as shop solutions, training, work group support, and CRM.

**There is a correlation between company size and ASP adoption behaviour.** Regarding the correlation of the variables company size and ASP adoption, there seem to be external factors at work that cause smaller companies to be more open towards the ASP approach. This is clearly a problem for the long-term growth prospects of the ASP market. This could be corrected, however, if it can be shown that ASP users clearly enjoy continuous competitive advantages due to their ASP usage.

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<sup>14</sup> Bode, Christoph (2000), p. 84