

Targeting new Customer Segments with Innovative Solutions: Application Service Providing for the Energy Management Sector

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Abstract

Application Service Providing (ASP) represents an attractive solution for many power companies that want to conduct their business more efficiently. Fast implementation, the outsourcing of the responsibilities for application development, operation and maintenance, low investment costs and the client's ability to concentrate on core competencies are the driving forces that promise a competitive advantage for companies competing in the liberalized energy market. The investment cycle of energy companies demonstrates that investments decline substantially during the pre-liberalization phase, due to an overall uncertainty. But immediately after the market deregulation, the participating companies articulate a high demand for solutions that meet the new requirements. Consequently, the investments of these companies increase. The outcome of our competitive analysis shows that mature solutions exist primarily in the US Energy market. But most services developed overseas are not directly applicable to the European market. There are only few European ASPs in the energy sector, and none of them offers an integrated solution. In order to evaluate

current demands, a market study has been conducted in Germany and Austria, complemented by an international competitive analysis that identified a high demand for outsourcing in a number of different business areas.

Keywords

Application Service Providing, energy management, outsourcing, market liberalization

1. Introduction

Especially in some European countries a lot of small, decentralized power stations exist. Those plants had a monopoly position in the regulated market, but as deregulation comes into force, they have to compete in the open market. Price pressure and the need to offer differentiated services urge energy companies to modernize their technical and organizational infrastructure. Reducing personnel cost or avoiding large investments (e.g., software applications) are effective ways to counter price pressure. At the same time, energy companies cannot afford to spend several years for designing and implementing an application due to the mounting time pressure.

Application Service Providing (ASP) is an appropriate solution to remain competitive in the deregulated market, especially for small to medium-sized power companies. Fast implementation, accessibility from every networked computer terminal, the outsourcing of responsibilities for development, operation and maintenance of the application, limited investment costs (only a monthly usage fee) and the client's ability to concentrate on core competencies are the driving forces that promise a competitive advantage for companies competing in the liberalized energy market. By means of ASP, small and medium-sized companies have access to complex applications that they could not afford previously. Lacity and Willcocks provide a detailed analysis of success factors that depend on the participants' perceptions rather than on the size of the enterprise. They identified fifteen categories of expectations/reasons for sourcing and pointed out that issues such as cooperation between senior executives and information technology managers, or an emphasis on short term contracts (in opposition to long-term contracts) represent important success factors (Lacity & Willcocks 1998).

Large organizations with specialized departments, high turnovers, and dedicated analysts for forecast and energy trading are the primary target group for traditional, custom-tailored software packages. The main target groups for ASP are small to medium sized companies, municipal utilities, distribution companies, and industrial enterprises with a high power demand. The personnel of these companies usually has a broad field of assignments. Rouse, Corbitt and Aubert have shown that outsourcing success is not unidimensional but multidimensional and that the satisfaction of the client heavily depends on the conversion of the service into strategic benefits (Rouse, Corbitt & Aubert 2001). In order to achieve the highest possible benefit for these potential customers, ASP solutions should be quick to understand and easy to use. Thus a reduction of the workload of the customer's planning personnel can be achieved.

2. Definition of Application Service Providing and Related Research

An ASP operator rents out an application which provides a specified functionality to users. Thus the user is not the owner of the software license; instead he pays a utilization fee (per month, per user or per transaction, or a combination from the mentioned possibilities). The operation and the support of the application, which serves many users, take place in a centralized location. The legal basis for ASP is created by service level agreements that stipulate the responsibilities of the ASP operator with regards to software licenses, availability, or regular updates. The users have access to the application through standard

browsers, windows terminals or specific client software via the Internet or other networks (Franke 2000).

There have been numerous authors who did considerable research in the discipline of outsourcing and ASP from different points of views. Some authors concentrate on economic, strategic or even global perspectives (Willcocks & Lacity 1997, Currie 2000, Lacity & Willcocks 2001) while others deal with issues such as customer or client relationships (Lee & Kim 1999, Susarla, Barua & Whinston 2002, Yao 2002). A variety of conceptual frameworks and business models (Tamm & Günther 2000) have been developed in order to categorize the various approaches on the market. The following sections are going to highlight the potentials of ASP in the energy sector – a market segment that is characterized by a long history of legal regulations and that is now facing dramatic changes as far as its business environment is concerned.

3. The Energy Market Liberalization

The objective of the EU directive 96/92/EC is to ensure the free movement of electricity while improving security of supply and the competitiveness of the European economy. The directive will, over a period of time, allow all large and medium sized purchasers of electricity to freely choose their suppliers (Daly 2002). It introduces full competition amongst generators immediately and is leading to significant price reductions across the EU to the benefit of business and consumers (European Commission 1999). The electricity directive sets out basic rules, which the member states have to incorporate in their legislation. In accordance with the subsidiary principle, member states are given a large margin of choice, as long as the different choices lead to equivalent economic results (European Commission 1997).

Opening up electricity production to competition is an important tool to improve the efficiency of the industry and thereby to benefit electricity consumers. In the past, a monopoly supplier could recover any costs regardless of whether it used its power sources efficiently or not. As soon as the rules of the market economy will come into operation, producers will cease to be sheltered by their exclusive rights to generate and supply electricity. Competitive forces will provide the driving force for producers to innovate and operate in the most efficient way in order to keep their clients and recover their investments. Innovation is the key underlying this change. In order to stay competitive market players are forced to innovate. Innovation not only leads to lower prices, but also helps to use energy resources more efficiently (European Commission 2001). Liberalization is a tool to stimulate efficiency and productivity gains by providing the incentive for innovation and adaptation to the needs of consumers (ICC 1998). Cost savings due to increased efficiency gains will be realized and lower prices for electricity users are expected that would otherwise not be possible. Service standards have also been improved in countries that have already undergone liberalization. Facing a unified European electricity market, competition will favor the least costly plant and reduce the required reserve capacity for the demand peaks of each country. The operation of a single market provides more outlets, better interconnections, and increased reliability. Competition is the driving force for utilities to operate as economically as possible in order to maintain their competitive advantage with all the anticipated benefits to consumers. At the moment there are different levels of market opening in the EU Member states (European Commission 2001): Austria: 100%; Belgium: 33%; Denmark: 90%; Finland: 100%; France: 30.27%; Germany: 100%; Greece: 30.27%; Ireland: 30.27%; Italy:

35%; Luxembourg: 40%; The Netherlands: 32%; Portugal: 30.27%; Spain: 53%; Sweden: 100%, United Kingdom: 100%.

The energy market deregulation will open the market and allow new participants to enter the sector (Brugger & Rabensteiner 2000). Energy will become a trading commodity and exchange platforms like energy auctions and energy portals will be able to quickly establish themselves on the market. Current examples are Power/Energy (power.about.com/mbody.htm), EEX (www.eex.de), and APX (www.apx.com). As a result of this reorganization, new forms of relationships between vendors and their clients will develop. Increasingly demanding customers will be able to freely choose their energy suppliers. The suppliers will have to differentiate themselves from their competitors by providing additional services. As a consequence, a previously monopolistic segment of the economy is transformed into a customer-oriented market (Frech, Kepka & Eble 2000).

4. Potentials of Application Service Providing

Deregulation in the energy sector dramatically changes the rules of the energy business. Companies become aware of time and cost constraints that call for standardized and modular solutions. Deregulation also impacts timing and the way of procuring energy management and information technology solutions. The investment policy of energy companies moving from a regulated to a deregulated environment can be divided in four different stages (Siemens 2001):

- In a regulated environment the demand for energy management solutions is mainly determined by the regular upgrading and replacement of existing Supervisory Control and Data Acquisition (SCADA), energy and distribution management systems.
- As soon as deregulation appears, changed rules and an enormous cost pressure lead to a sharp decline in investments. Avoidable investments (such as SCADA systems, stock keeping, etc.) are deferred, which is amplified by excess reserves that have been built up in the regulated environment.
- Immediately after deregulation the energy companies invest in tools that support the new business processes dictated by the deregulated market (e.g., trading and optimization tools).
- As soon as energy companies establish processes and supporting tools to satisfy their immediate needs, core processes and work flows become the focus of optimization, and an incentive to further pursue systems integration.

Facing a lot of constraints and an enormous time pressure, energy companies cannot rely on the traditional procurement approach any longer. This approach includes the planning of a system with several years of anticipation and a high level of detail regarding system specifications. Deregulation calls for procuring to be fast and modular, and fuels a need for off-the-shelf system components.

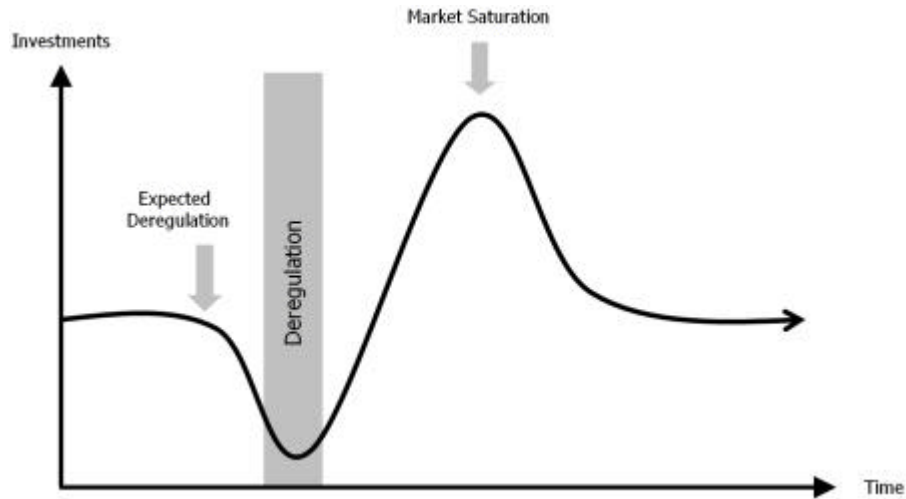


Figure 1: The investment cycle of energy companies before and after deregulation

ASP represents an excellent solution for the liberalized power market. Fast implementation, standardized applications and outsourcing of the responsibility for development, operation and maintenance are the driving forces that can assure an enormous competitive advantage for energy companies competing in a liberalized market. Fitzgerald and Willcocks (1994) differentiate between six different types of contracts that can occur between vendors and clients: 1) time and materials, 2) fixed fee, 3) fixed fee plus variable element, 4) cost plus management fee, 5) fee plus incentive scheme, and 6) share of risk and reward. The kind of partnership is determined by the characteristics of the application, which are discussed in the following section.

5. Competitive Analysis

The market survey of ASP energy solutions was performed on the basis of general criteria (description of the service functionality), special features (distinguishing characteristics of the services), content description (in-depth investigation of the special features), and support (additional customer value). The data for this competitive analysis were gained from a secondary market study of Web-based resources. The outcome of this analysis showed that especially in the US market mature solutions for the energy sector exist. However, those services are usually not applicable to the European market with its lack of integrated solutions. The services of the following suppliers were evaluated in detail:

- Asea Brown Boveri AG (www.abb.com)
- Alstom ESCA Corporation (www.esca.com)
- Caminus Corporation (www.caminusonline.com)
- Open Access Technology International, Inc. (www.oatiinc.com)
- Siemens AG (www.siemens.com)

Company	Product Name	ET	CS	LF	PF	TM	RI	SA	RE	AM
Alstom ESCA	e-terra supply	P						S		S

	e-terra oasis					P		S		
	e-terra schedule	S	S			P				
	e-terra platform		P					S		
	e-terra commit					P		S	S	S
	e-terra automation					P		S		
	e-terra comm		P							
	e-terra retail			S					P	S
	e-terra dealmaker	P	S			S	S	S		
	e-terra market clearing	S	S		S	P				
	e-terra hedge	P	S		S	S	S			
ABB	Forecasting service		S	P				S		
Caminus	Manager	P						S		
	Weather Delta	S		S	S			S	P	
	Risk Analytics				S			P	S	
	Physicals	S	S					P		
OATI Inc.	Tagging System		S			P				
	WebCARES System		P							
	Congestion Management		S			P				
	OASIS webSweep					P				
	WebScheduler		S			P				
	WebTrans		S			P				
	WebOASIS		P				S			
	WebTrader	P					S	S	S	
	OpenTrading	P	S							
	ETS Transmission Provider OASIS Interface						P			
Siemens AG	E-Scheduler		S			P				

P ... Primary Feature	LF ... Load Forecast	SA ... Simulation & Analysis
S ... Supplementary Feature	PF ... Price Forecast	RE ... Resource Management
ET ... Energy Trading	TM ... Transmission Mgmt.	AM ... Asset Management
CS ... Communication/Data Conversion	RI ... Risk Management	

Table 1: Tabular comparison of selected products

6. Market Survey

The market survey was conducted by using a qualitative questionnaire that investigated the attitude of energy companies with regards to ASP services and their potential problems. The questionnaire was sent to 546 Austrian and German energy companies. 37 properly completed questionnaires represent a response rate of 6.78%. The first part of the

questionnaire comprised straightforward questions such as: *What is your position in the company? With which department are you affiliated? How long have you been working in the energy sector?* In order to focus respondents on the topic, some of the questions were clustered: *How is the load-/ sales-forecast determined in your company? What is the procedure of unit commitment? What is the procedure of medium to long term resource/asset management?* The questionnaire's complexity was gradually built up to maintain involvement. While the initial questions were of classificatory nature, more complex issues were raised at the end. When addressing a topic, behavioral questions were asked first, followed by attitudinal ones, e.g.: (a) *Do you actively use the Internet in your company?* (b) *Can you imagine using an ASP energy management application in the future?* Sensitive topics were placed at the end of the survey: *What has to be done to increase your readiness to provide an ASP with internal data?*

6.1 Desired Functionality

In order to provide concrete value for energy companies, ASPs have to implement diverse functionalities that can easily be integrated into the business processes of the client. Due to the fact that no comprehensive service packet exists that comprises all the requested components, the needs of the companies are grouped by organizational size (number of employees). Figure 2 summarizes the most desired functionalities that are expected from energy management ASPs.

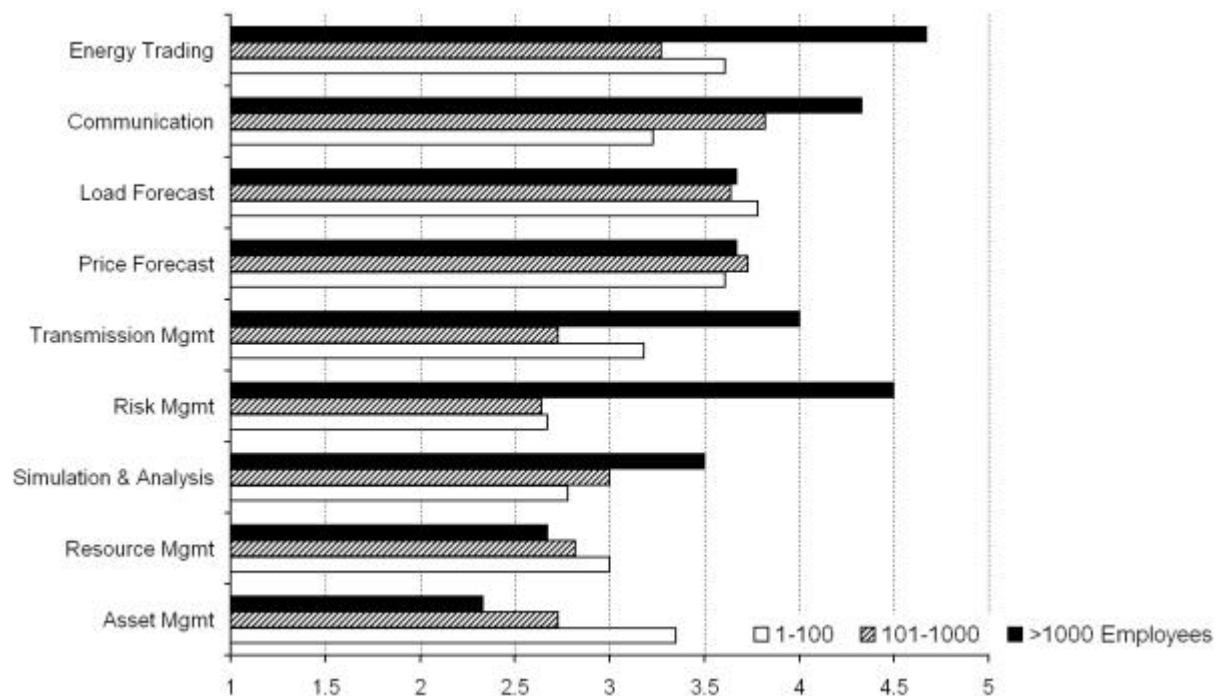


Figure 2: Desired functionalities from energy management ASPs

Energy Trading

According to the competitive analysis most trading applications are tailored to the US market. In the European market the "e-terra dealmaker" (Alstom ESCA) and the "manager"

(*Caminus Corporation*) are the two most important applications available via ASP. About 20% of the respondents stated that they already actively trade at energy exchanges, another 16% are planning to do so.

Communication / Data Conversion

According to the competitive analysis, Alstom ESCA offers two such applications: e-terra platform and e-terra comm. OATI Inc. has the WebCARES System and the webOASIS. The range of communication/data conversion of the application is very broad and can be seen as supporting as well as supplementing tools for other features offered by a company. Security and interfaces to existing applications are critical ASP issues and deserve highest priority when deploying communication and data conversion applications. In the context of technology acceptance, it is interesting to note that the willingness to test an energy management application positively correlates with the willingness to use such an application (measured via Pearson correlation coefficient; $r=.803^{**}$, $n=31$, $p=.000$).

Correlations

		Probability to test an Energy Management Application	Probability to really use an Energy Management Application
Probability to test an Energy Management Application	Pearson Correlation	1.000	.803**
	Sig. (2-tailed)	.	.000
	N	32	31
Probability to really use an Energy Management Application	Pearson Correlation	.803**	1.000
	Sig. (2-tailed)	.000	.
	N	31	31

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2: The willingness to test an energy management application positively correlates with the willingness to use such an application

Load Forecasting

Only ABB offers a forecasting service via the Internet in spite of the fact that load forecasting is a crucial feature for every energy company. Usually companies are willing to send planned and actual load data via the Internet. The readiness to send planned load data via the Internet is positively correlated with the request for a load forecasting feature ($r=.363^*$, $n=31$, $p=.045$). According to the statistical evaluation of the questionnaire, the load forecasting procedure is usually handled manually (36.11%) or via pattern search (33.33%), indicating an untapped segment of the market.

Correlations

		Request for the Feature "Load Forecast / Load Profile"	Probability to send planned Load Data via Internet
Request for the Feature "Load Forecast / Load Profile"	Pearson Correlation	1.000	.363*
	Sig. (2-tailed)	.	.045
	N	32	31
Probability to send planned Load Data via Internet	Pearson Correlation	.363*	1.000
	Sig. (2-tailed)	.045	.
	N	31	33

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3: The readiness to send planned load data via the Internet positively correlates with the request for a load forecasting feature

Price Forecasting

All companies that have been included in the analysis only offer price forecasting as a supplementary feature. The statistical evaluation of the questionnaire suggests that price forecasting is a very desirable feature for energy companies. But according to the answers given, most energy companies can hardly imagine sending purchase prices via the Internet which shows that there is a need for a price forecasting application where special attention has to be paid to security issues. The empirical evaluation of ASP problems suggests that the provision of strong encryption or dedicated lines is the most appropriate measure to increase acceptance. Price forecasting application services are needed by the energy companies, but ASPs need to strengthen the customers' trust in the security of such services.

Transmission Management

There are a number of ASPs that offer transmission management services: Caminus Corp. (Physicals), Alstom ESCA (e-terra oasis and e-terra schedule, which are exclusively sold on the US market, e-terra automation, e-terra commit and e-terra market clearing), OATI Inc. (tagging system, OASIS webSweep, webScheduler, ETS transmission provider OASIS interface, congestion management, and the webTrans, which are all specific to the US market), Siemens AG (e-scheduler, which provides features for scheduling energy and transmission between involved parties). It seems that there are plenty of transaction applications that meet the requirements of the US market. For the European market a few exist, but they are hard to deploy due to differing regulations.

Risk Management

Reasonable supplementing features for trading applications are risk management features. Especially larger companies (> 1.000 employees) said that for them trading and risk management are crucial features of energy management applications which indicates that trading will become more and more important in the future, especially for larger companies. This is why a trading application via ASP seems to be reasonable. A feature, comparable to the OATI OpenTrading application which is freely available to the market participants seems to be a good marketing tool. According to the competitive analysis the only tool that mainly

offers risk management is risk analytics by Caminus, which provides a set of risk assessment and risk management tools designed specifically for the competitive market. As risk management tools usually accompany trading applications, it makes sense to provide a trading application with a sophisticated risk management feature.

Simulation and Analysis

Caminus provides a simulation and analysis tool, which is called Weather Delta. With this Application the impact of weather on load, generation, retail contracts, and traded positions can be determined. A simulation and analysis application could be used as a marketing tool and provided as a free test version, so the users will be able to work with the application and experience the advantages of such applications without having to invest a lot of money.

Resource and Asset Management

Only Alstom ESCA offers a resource management tool, called e-terra retail. Most energy companies do not think that Resource- and Asset Management is a very urgent and necessary feature of Energy Management via ASP. According to the statistical evaluation 77.14% of the respondents stated that they use manual methods for medium to long term resource and asset management.

Perceived Problems of Application Service Providing

Our survey also dealt with specific ASP problems. Figure 3 summarizes how the respondents rated potential problems. As can be seen from the diagram, energy companies regard interfaces to existing data processing systems, security of data transmission and the lack of possibilities for customizing as the most critical ASP problems.

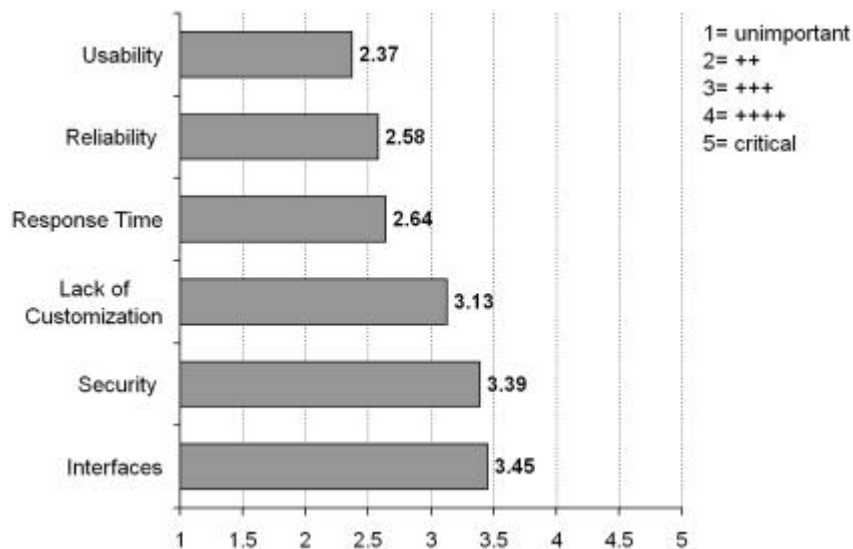


Figure 3: Perceived Problems of Application Service Providing

A critical attitude towards interfaces to existing information systems negatively correlates with the readiness to outsource an energy management application. With a Pearson correlation coefficient of $r=-.472^{**}$, a negative correlation has been established ($n=30$,

p=.008). The implementation and maintenance of interfaces to existing information systems can be facilitated by using standardized data formats.

Correlations

		Probability to really use an Energy Management Application	Rating of Problem "Interfaces"
Probability to really use an Energy Management Application	Pearson Correlation	1.000	-.472**
	Sig. (2-tailed)	.	.008
	N	31	30
Rating of Problem "Interfaces"	Pearson Correlation	-.472**	1.000
	Sig. (2-tailed)	.008	.
	N	30	33

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4: A critical view of the interface problems negatively correlates with readiness to outsource an energy management application

As a consequence, intuitive and flexible interfaces that meet customer expectations are crucial. The security problem of data transmission and storage can be avoided by using virtual private networks, encryption, and dedicated lines. Especially encryption is seen as an appropriate measure to improve the trust in an ASP. The problem of the lack of customizing/tailoring can be improved by providing the possibility of simple programming. When offering applications via ASP, strong marketing activities that strengthen the trust in the security of such an application have to be made. The provider must supply the correct interfaces to existing applications and has to provide standard applications with no need for customizing.

The respondents see relatively few problems concerning the reliability of the connection and the Internet, time of response and the usability of such applications. But nevertheless special attention should be paid to provide server redundancy and fixed connections. In order to improve the time of response, the best possible server performance should be guaranteed, as well as a stable underlying system architecture. In case the number of inquiries at a given point in time exceeds the system's capacity, mechanisms for load balancing should be available to improve time of response, so that the customer will not lose trust in the overall performance. When offering complex applications such as energy management software, the provisioning of effective support is crucial. Some possibilities are e.g. to offer service packages including instructional courses and the implementation of a telephone hotline.

7. Conclusions

With the increased competitiveness of international markets, companies tend to specialize and to concentrate on their core competencies. They have to cooperate in order to increase efficiency, lower their R&D risks, access new international markets, or to hedge against emerging technologies (Zee 2002). Special emphasis has to be placed on partnerships where crucial processes are outsourced. This inevitably leads to a strong dependency on the products or services of other companies. Kern, Lacity and Willcocks (2002) have shown that nearly all organizations will 'hsource' at least some of their services over the next five

years. They identified special drivers (business drivers, technology drivers, economic drivers, relational drivers, and the market for information technology services) and evaluated the importance of different issues for the customer such as availability, quality of services, security, reliability, or responsiveness. Our survey concentrated on the energy market as a particular sector of the economy that is determined by the deregulation that is currently taking place. Although there are a number of ASP suppliers, none of them offers the full spectrum of specialized services the companies need. Huff, Wade, Parent, Schneberger and Newson (2000) identified critical success factors for Electronic Commerce that can also be applied to ASP: 1) add value, 2) focus on a niche ... then expand, 3) maintain flexibility, 4) segment geographically, 5) get the technology right, 6) manage critical perceptions, 7) provide exceptional customer service, 8) create effective connectedness and 9) understand Internet culture. The complexity of the desired functionality and the perceived problems suggest integrated solutions with a lot of built-in flexibility. Currently, however, the lack of appropriate interfaces and security issues are among the most important factors that prevent companies from implementing ASP solutions.

The testing of our hypotheses has shown that those companies are most likely to outsource part of their services that: a) had some prior experiences with the applications or b) generally have a high trust in the possibilities offered by new technologies. Taking into account the overall potential of the market (Muse & Wainwright 2001), and the need for companies to quickly adapt to their new economic environment, ASPs are going to play an important role in the European energy market in the upcoming years.

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