Factors that Influence SMEs' Adoption of Application Service Providers

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ABSTRACT

Many business organizations use outsourcing to acquire their information technology (IT) systems. As outsourcing contracts remain expensive, small and medium sized enterprises (SMEs) were unable to benefit from this model and its associated benefits. The emergence of Application Service Providers (ASPs) was heralded as a way to resolve the IT deficiencies of SMEs and enable them to access applications, technology and skills that were previously unaffordable to them. However, the ASP model has not enjoyed as much success as initial predictions and SMEs remained unconvinced of its value. This study explores the issues surrounding SMEs' adoption of ASPs. The study is based on three case studies conducted in Greece. Using theories relevant to innovation adoption, we identified some of the pertinent factors that can potentially influence SMEs' ASP adoption.

INTRODUCTION

Small and Medium Size Enterprises (SMEs) represent a significant proportion of a nation's economy. Within the European Union, there are more than 18 million SMEs representing 59% of the total economy and generating 67% of employment (Brown and Lockett 2004). Governments and policy-makers throughout Europe recognise this pivotal role of SMEs and regard the use of information and communications technologies (ICTs) as crucial to SMEs' competitiveness and survival (Dutta and Evrard, 1999 Lockett and Brown, 2005). Although, in terms of basic computer usage, SMEs appear on par with larger organizations, their usage of complex applications are relatively limited (European Commission, 2004). Some of these disparities can be related to the fact that smaller companies may not need the same level of IT sophistication as larger ones. However, financial constraints, lack of organisational readiness, lack of technical skills, and high cost of technology ownership have also contributed to SME's limited use ICTs (Ballantine et al, 1998).

Application Service Providers (ASPs) change the delivery of IT functionalities and provide the opportunity to access IT applications more economically (Vorisek and Feuerlicht 2004). ASPs offer applications ranging from standard office automation to enterprise software. They also offer additional services such as maintenance, digital content storage, e-commerce training, business process support, and helpdesk services (Kakabadse *et al.* 2004). However the ASP model of IT delivery has not been as successful in attracting a critical mass of SMEs as initial predictions (Currie et al. 2004; Susarla et al. 2003). Some research has therefore gone into identifying the factors that affect the adoption of ASPs (see Jayatilaka *et al.* 2003 and Yao *et al.* 2003). These previous studies have made significant insights regarding ASP and host organization specific factors that influence adoption. However, the experiences of SMEs in general and those in Europe in particular have not received that much research. It is therefore essential to understand what influence SMEs' to adopt ASPs. This current study builds on previous works and focuses on the determinants of ASP adoption among European SMEs. The objective is to identify some of the pertinent factors that influence SMEs' decision in adopting ASPs.

ASPS AND SMES: THE VALUE PROPOSITION

The ASP model is premised on the formation of strategic partnerships between ASPs and other software and hardware vendors, internet service providers and outsourced data centres (Kakabadse *et al.* 2004; Susarla et al, 2003). These partnerships create a complex network of relationships and can be leveraged to provide seamless service to clients either in the vertical or horizontal markets.

From an SME perspective, some of the values ASPs propose include *access to technical skills, low up-front investment, access to high-end applications and shifting maintenance responsibility to vendors*. SMEs face problems to attract and retain highly skilled IT professionals. Hence, their partnership with an ASP can help them to effectively overcome this problem. SMEs are also characterized by restricted access to capital and financial resources. Because ASPs charge service-based rather than up-front fee, they minimize the level of initial investment an SME normally requires to acquire IT solutions (Kakabadse *et al.* 2004). This is particularly true in case of enterprise systems. ASPs can offer SMEs the functionalities of complex high-end applications such as ERP and CRM systems in lesser time and with minimum risk than it would have taken an SME if it tries to do it on its own (Lockett and Brown, 2005). In addition, SMEs can shift maintenance tasks including backup and disaster recovery to ASPs.

Despite the benefits mentioned above, the ASP model also entails a number of risks and concerns for SMEs. First, data security and privacy become crucial concerns for a firm when applications are accessed over the Internet and stored in remote computers (Curtis and Alphonso 2000). Second, SMEs' may face vendors' threat of opportunistic behaviour (Johansson 2004; Serva *et al.* 2003). Third, although the ASP model generally presents a low cost solution, there is also the risk of increased long-term costs due to pricing inconsistencies (Kakabadse *et. al.* 2004, Singh et. al. 2004). cit_bf

In summary, the value of ASPs to SMEs comes with a substantial amount of risks. Although a rational model assumes that adoption can be influenced by positive evaluation of benefits over risks, SMEs take a much more informal approach to decision making, therefore their adoption process involves more than simply evaluating a value proposition. The following section will outline the theoretical frameworks that informed our enquiry

THEORETICAL BACKGROUND

Of the theories often used in the innovation adoption and outsourcing literature, we discuss the *diffusion of innovations, transaction cost and mimetic isomorphism* theories.

The *diffusion of innovation* theory postulates that adoption is influenced by the characteristics of the innovation, the adopting organization and individual leaders (Rogers, 1995). The theory implies that SMEs' perception of the values outlined in the previous section can contribute to their decision to accept ASPs. The ASP model might be compatible to SMEs that prefer to rent resources rather than to purchase them. Equally, the opportunity SMEs have to try and assess ASP offerings will have a positive influence on their adoption decision.cit_af

ref_bf(Johansson, B. 2004 ref_num389)ref_af On the other hand, the practice of accessing applications over the internet, and the various contractual and service level agreements may be too complex for most SMEs and can influence adoption negatively. In addition, SMEs are characterised by loose structures and a high degree of informality in their processes and decision-making characteristics. cit_af ref_bf(Burgelman, R. A. 1983 ref_num456 / Ross, J. 1987 #457 / El-Namaki, M. S. S. 1990 #425 / Gagnon, Y. C. 2000 #440)ref_afSuch internal organisational characteristics can facilitate adoption. However, SMEs display a level of centralisation that can make them averse to innovation unless the owner-manager displays entrepreneurship and a more positive attitude towards change and innovation. SMEs' limited endowment with resources might encourage them to seek solutions that are affordable and less complex to implement, promises ASPs' seek to deliver.

The *Transaction Cost Theory* (TCT) has been used to further explain some of the factors that influence the decision to adopt ASPs cit_bf(Jayatilaka et al., 2003; Yao et al, 2003). The main argument behind the TCT is that an organisation should balance production economics against transaction costs to achieve efficiency cit_bf(Yao *et al.* 2003)cit_af ref_bf(Yao, Y. 2003 ref_num391)ref_af. Generally, when services are produced internally, transaction costs are low and production costs are high whereas when rendered by an external vendor, transaction costs become higher while production costs are driven down cit_bf(Singh et al, 2004)cit_af ref_bf(Williamson, O. E. 1979 ref_num465)ref_af. Thus TCT predicts that organizations tend to follow the lowest cost strategy and choose to outsource an activity if production costs are higher than transaction costs cit_bf(Serva *et al.* 2003)cit_af ref_bf(Serva, Mark A. 2003 ref_num332)ref_af. Given the cost reduction and efficiency focus of SMEs, ASPs' low up-front investment and maintenance costs may encourage their use cit_bf(Johansson 2004)cit_af ref_bf(Johansson, B. 2004 ref_num389)ref_af. However, uncertainty in terms of vendor's opportunistic behaviour to increase transaction costs, especially in the case of customised applications, could deter SMEs from using ASPs or could lead them to reputable (trusted) but high cost providers cit_bf(Jayatilaka *et al.* 2003)cit_af ref_bf(Jayatilaka, B. 2003 ref_num329)ref_af.

The concept of *mimetic isomorphism* argues that organizational change can occur as the result of processes that make organizations more similar without necessarily making them more efficient (DiMaggio and Powell, cit_bf1983)cit_af ref_bf(DiMaggio, P.J. 1983^na ref_num113)ref_af. The underling assumption is that uncertainty in a firm's external environment can encourage imitation and modelling after successful organizations (ibid). Adoption of an innovation can therefore be the product of intentional or unintentional modelling. SMEs face intense competition, have a high degree of informality and generally lack strategic direction in their IT decisions. Such characteristics can induce uncertainty and lead to mimetic practices. Furthermore, the participation of SMEs in industry and trade associations provides a platform through which SMEs can observe and possibly imitate other organizations that they perceive as successful cit_bf(Brown and Lockett 2004; Dutta and Evrard 1999)cit_af ref_bf(Dutta, S. 1999 ref_num418 / Brown, D. H. 2004 #394)ref_af.

Table 1: Theoretical Antecedents of ASP adoption

Theoretical Perspective	Factors with a positive influence	Factors with a negative influence
Diffusion of Innovations	• Perceived benefits • Compatibility • Observability	• Complexity • Unfavourable owner-managers attitude
Transaction Cost Theory	• Lower transaction costs • Good vendor reputation	• Difficulty in obtaining customised applications • opportunistic behaviour
Mimetic Isomorphism	• Other firms' adoption of ASPs	• Absence of exemplary firms

Based on the analysis, table 1 summarises the theoretical antecedents of ASP adoption.

DATA COLLECTION

In order to identify the factors that influence ASP adoption, a case study was employed. Five SMEs in Greece were initially approached for the study. Two were not aware of the ASP model and were unable to provide meaningful information. The study proceeded with three case studies (referred in this study as case A, B and C), out of which one is using an ASP and the remaining two have an intention to use an ASP. Data were collected through semi-structured interviews with owner-managers (in cases of Case A and B) and Human Resources Manager (in Case C)

Case Description

Case A

Case A is a human resources consulting company established in March 2000. It has a 50-person workforce and specialises in the provision of HR consulting and recruitment services including. Its annual turnover is 18 million Euros. The company uses a variety of accounting, office and payroll applications all maintained in-house by its IT manager. However, the company also rents a client management application from an ASP. According to the company's manager, all applications are viewed as support rather than strategic in nature. He further noted that: "*There is no particular procedure or strategy followed for our IT investments. Usually, the final decision is upon me and our IT manager. The criteria under which we decide are cost and functionality*". However no formal methods are used for assessing the total cost of ownership of the company's ICT infrastructure.

The rented client management system is a Web system to hold information on job applicants and business customers. It also provides further functionality such as personality, capability and skills testing. The system is developed and hosted by the ASP and is integrated with the customer management application so as to provide real-time updates to the company's database. The company decided to engage the services of an ASP because the ASP had the technical capacity to provide this type of service in an affordable and customisable way. In the words of the manager,

"We wanted to improve our service delivery through an on-line service. Using an ASP saves us money and provides us the necessary technical know-how and customisation we needed for the service."

However, the manager also mentioned some negative experiences with the ASP. More specifically, he stated that "*it sometimes takes too long for the changes we want in the application to be implemented by the provider*". Furthermore, the manager mentioned concerns about the company's "*dependence on the Internet to access the application*". The application rented by the company handles information that is crucial to its business and sometimes confidential such as job applications and test scores. The manager expressed his fear of breach of privacy if data integrity is compromised while accessing the application. In addition, he expressed his worries regarding the reliability of the system as there have been a few incidences where the company could not access its hosted application.

Case B

The second case is a Software Developer that was established in 1984. It currently employs seven people and has an annual turnover of 500,000 Euros. The company develops standardised and customised software applications with a focus on financial and accounting systems. The company does also develop "web-facing" versions of its software specifically for use by ASPs.

This company is not using ASPs. According to the manager, "*... we are in the business of application development and have not had the need*

to use an ASP. We do not reject ASPs though since they are our clients and we partner with them to develop web-facing applications". Naturally, most of the arguments of using ASPs do not apply to this company and to most of the firms in the software sector as well. However, the company's manager appears to have a positive attitude towards the ASP model and identified maintenance responsibility, access to complex applications and low up-front costs as his first, second and third most attractive characteristics of ASPs. In terms of future intention, the manager noted that the company might consider renting "*Cost Control, CRM and Project Management systems".*

Case C

The third case is a logistics company that has been in operation since 1946. The company provides international logistics and transportation services to business and private customers and currently employs 150 people with annual turnover of 43 million Euros. It uses a variety of applications specific to the logistics function as well as an ERP system and various office automation packages. The company owns all of its applications and maintains most of them. However, there are a few systems specific to the logistics and transportations sector that are maintained by external software vendors but are installed in the company's own IT facilities. Case C can be characterised as a medium-sized operation and has a more formalised structure than the other companies presented in this study. Although there is no particular IS strategy documented in the company, there is a formalised process under which IS/IT investment decisions are made. The main criterion for such decisions is application functionality.

Although the company has considered the ASP option for obtaining some applications, this has not been done so far. As the manager explained:

"The primary reason the ASP option has not moved forward yet is that in the areas where ASPs could really provide a solution the company has already made considerable investment. Another reason is that the large degree of customisation required to serve the needs of our business is not something ASPs can easily provide. Third, we were concerned about issues such as security and the track record of the ASP in serving our industry".

Evidently, Case C places great emphasis in obtaining applications adaptable to its needs, in security and in vendor's reputation.

CASE ANALYSIS

The case findings indicate that the primary reasons for ASP adoption (or intention to adoption) were access to specialised skills and the flexibility of transferring responsibility for application maintenance and low-up front costs. It appears that although cost savings can motivate adoption, SMEs tend to value transfer of maintenance responsibility and access to scarce skills more than cost reduction. This could be due to the fact that SMEs have low IT expenditure and therefore may not expect to make significant cost savings due to ASPs. This reinforces Currie et al (2004) findings where SMEs in the UK expressed their willingness to pay more for ASPs if that means hassle-free IT use. However, the experience of Case B suggested that the influence of access to IT skills and transfer of maintenance responsibility may be annulled due to the specific characteristics of the industry in which an SME operates. ASP's capability to provide some degree of integration might positively influence adoption too. For instance, Case A's decision to adopt ASP was motivated by its ability to integrate its Website with the customer management application. In a similar vein, Johansson's (2004) study indicated ASPs' inability to provide integration as one of the factors that inhibit Swedish SMEs adoption of ASPs. Evidently SMEs seem to choose providers that have integration capabilities. cit_af ref_bf(Carr, Nicholas G. 2005 ref_num315)ref_af

The ability to access highly complex applications such as ERP systems emerges as another factor affecting adoption. But this tended to be specific to the sector and relative size of SMEs. For instance, Case C, which is a medium-sized logistics company, has indicated easier access to ERP systems as one of the factors that might influence its decision to consider ASPs. According to the cit_bfEuropean Commission (2004), cit_af ref_bf(European Commission, 2004 ref_num445)ref_afadoption of enterprise systems increases with firm size with 21% of medium-sized companies using such systems compared to an average of 4% and 12% for micro and small enterprises respectively. However, given the fact that more than 90% of the European SME sector consists of small enterprises and that 80% of SMEs operate in sectors with less need for enterprise software, it can be argued that the influence of access to complex applications as a driver of ASP adoption would be quite limitedcit_bfcit_af ref_bf(Dutta, S. 1999 ref_num418)ref_af.

In terms of the factors that contributed to non-adoption of ASPs, the inability of ASP vendors to customise their applications was noted. This sentiment was reflected in Case A and C. ASPs generally offer one-to-many solutions and tend to provide limited customisationcit_bfcit_af ref_bf(Boyle, Robert D 2002 ref_num342 / Klueber, R. 2002 #407)ref_af. Application customisation tends to decrease the ability of ASPs to achieve economies of scale and ASPs tend to prefer conformity of systems across multiple customers cit_bf(Benett and Timbrell 2000)cit_af ref_bf(Benett, C. 2000 ref_num366)ref_af. However, customisation may not be a major issue for smaller organizations since usually medium and large firms are the ones that usually seek customised solutions. Indeed, both organizations that mentioned the importance of customisation, namely the Logistics and HR Consulting companies, can be characterised as medium-sized.

Security and privacy concerns appear to be among the deterrents of ASP use. All the cases in this study mentioned communication and data security issues as the greatest concerns of ASP use. However, such concerns are very significant to firms that by their nature handle sensitive data. Therefore it could be argued that security and privacy concerns can act as a deterrent to adoption and that such concerns might have a greater impact in sectors that deal with more sensitive information.

DISCUSSION

As stipulated in the diffusion of innovations theory, perceived relative advantage has emerged as one of the factors that positively influenced SMEs adoption of ASP. However, the impact of some of these advantages appears to vary according to the relative size and industry of the SMEs. The importance of observability and mimetic practices in ASP adoption was not significant. Furthermore, issues such as the ASP model's complexity or owner managers' personal attitudes toward innovation could not be substantiated in the current study.

Transaction Cost Theory supports anticipation of cost savings is a major reason for adoption. However, TCT implies the use of rational cost measurement methods to inform adoption decisions. Nevertheless, the findings indicate that although cost savings were anticipated, there was no formal procedure to measure the total cost of ownership. This seems to suggest that the decision to adopt was taken based on instinct and limited information rather than hard, rational financial measurements. Furthermore, TCT implies that organizations will avoid customized ASP offerings because they would tend to increase external coordination costs for adopting organizations as well as the likelihood for opportunistic provider behaviorcit_bfcit_af ref_bf(Gupta, A. 2005 ref_num359)ref_af. However, the reality in SMEs seems to be somewhat different. SMEs appear not to recognize the potential for increased coordination costs from customized ASP offerings. This could possibly be attributed to their general lack of formalized cost control methods through which they would measure such costs.cit_b.

The above discussion sheds light on the influencing factors of ASP adoption by SMEs. Evidently although some of the potential factors, such as observability and mimetic practises, seemed to bear a satisfactory

Table 2: Some Factors That Influence the Adoption of ASPs by SMEs

Factors with Positive Influence	Factors with Negative Influence
- Access to scarce ICT skills - Anticipated cost savings - Integration capability - Access to complex systems (sector and size-specific) - Good vendor reputation	- Limited customisation of ASP applications - Security threats (mostly Internet-related, depends on sensitivity of data) - Communication unreliability

theoretical grounding, the data collected for the purposes of this study did not provide enough evidence to identify their influence. This was also true for the negative attitude of managers towards innovation. Overall, the case study identified the factors that might affect ASP adoption as summarised in table 2.

CONCLUSION

This study has attempted to explore some of the factors that affect the adoption of ASP solutions. While SMEs can benefit from the ASP model, it also exposes them to some risks and uncertainties. The theoretical frameworks suggested a number of factors that might influence adoption. Data collected from three cases has tested the relevance of some of the factors identified by the various theories. However the study is limited both in terms of the number of cases and the comprehensiveness of the factors that might affect adoption.

Within the above limitations, the findings of this study can provide a basis for future research to further explore the interactions of ASPs and SMEs in Europe. The findings can also be helpful to practitioners in the ASP industry to understand the type of offerings SMEs seek and meet those demands effectively. Nevertheless, a theme that arises from this study is that sector and size differences within SMEs themselves have been found to play a significant role in ASP adoption. In that respect, future research shall focus on exploring SMEs' ASP adoption within specific sectors or firm sizes to provide stronger conclusions. Furthermore, given the limitations of this study, research about specific regions or countries within Europe could also provide valuable insights in terms of how various political and cultural contexts may influence adoption.

REFERENCES

Ballantine, J., Levy, M. and Powell, P. (1998) 'Evaluating information systems in small and medium-sized enterprises: issues and evidence', *European Journal of Information Systems*, Vol. 7, pp. 241-251.

Brown, D. H. and Lockett, N. J. (2004) 'Potential of critical e-applications for engaging SMEs in e-business: a provider perspective', *European Journal of Information Systems*, Vol. 13, pp. 21-34.

Currie, W. L., Desai, B. and Khan, N. (2004) 'Customer evaluation of application services provisioning in five vertical sectors', *Journal of Information Technology*, Vol. 19, pp. 39-58.

Curtis, H. L. and Alphonso, R. J. (2000) 'Pros & cons of ASPs', *Strategic Finance*, Vol. 82, No. 3, pp. 34-38.

DiMaggio, P. and Powell, W. (1983) 'The iron cage revisited: institutional isomorphism and collective rationality in organizational fields', *American Sociological Review*, Vol. 48, No. 2, pp. 147-160.

Dutta, S. and Evrard, P. (1999) 'Information Technology and Organisation within European Small Enterprises', *European Management Journal*, Vol. 17, No. 3, pp. 239-251.

European Commission (2003) *Commission Recommendation Concerning the definition of Micro, Small and Medium-Sized Enterprises*, European Commission, Brussels.

Jayatilaka, B., Schwarz, A. and Hirschheim, R. (2003) 'Determinants of ASP choice: an integrated perspective', *European Journal of Information Systems*, Vol. 12, No. 3, p. 210.

Johansson, B. (2004) *Deciding on Using Application Service Provision in SMEs* Thesis, Department of Computer and Information Science, Linkoping University, Linkoping, Sweden.

Kakabadse, N. K., Ahmed, P. K. and Kouzmin, A. (2004) 'The ASP phenomenon: an example of solution innovation that liberates organization from technology or captures it?', *European Journal of Innovation Management*, Vol. 7, No. 2, p. 113.

Lockett, N. J. and Brown, D. H. (2005) 'An SME Perspective of Vertical Application Service Providers', *International Journal of Enterprise Information Systems*, Vol. 1, No. 2, pp. 37-55.

Rogers, E. M. (1995) *Diffusion of Innovations*, Free Press, New York.

Seltsikas, P. and Currie, W. L. (2002) 'Evaluating the Application Service Provider (ASP) Business Model: The Challenge of Integration', paper presented at the 35th Hawaii International Conference on System Sciences, Hawaii

Serva, M. A., Sherer, S. A. and Sipior, J. C. (2003) '"When Do You ASP?" The Software Life Cycle Control Model', *Information Systems Frontiers*, Vol. 5, No. 2, p. 219.

Singh, C., Shelor, R., Jiang, J. and Klein, G. (2004) 'Rental software valuation in IT investment decisions', *Decision Support Systems*, Vol. 38, No. 1, p. 115.

Smith, A. D. and Rupp, W. T. (2003) 'Application service providers: An application of the transaction cost model', *Information Management & Computer Security*, Vol. 11, No. 1, p. 11.

Susarla, A., Barua, A. and Whinston, A. B. (2003) 'Understanding the service component of application service provision: An empirical analysis of satisfaction with ASP services', *MIS Quarterly*, Vol. 27, No. 1, p. 91.

Vorisek, J. and Feuerlicht, G. (2004) 'Is it the Right Time for the Enterprise to Adopt Software-as-a-Service Model?', *Information Management*, Vol. 17, No. 3/4, pp. 18-21.

Yao, Y., Wohl, M., Watson, E. and Chen, Y. C. (2003) 'Customers' Decision to Adopt Application Service Provider and Applications Service Providers' Business Strategy in the Hospitality Industry: A Research Framework', *Journal of Information Technology Cases and Applications*, Vol. 5, No. 3, pp. 57-75.

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