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SOFTWARE AS A SERVICE: IN SEARCH OF BUSINESS VALUE FOR SMES IN POLAND

Abstract: Today SaaS solutions are significant subject of interest for both researchers and practitioners. With contemporary Internet technology it is possible to use software application delivered by any distant provider. The common SaaS adoption in small and medium-sized enterprises (SMEs) seems to be matter of time. SMEs in Poland are characterized by restricted investment capital, which could support their IT infrastructure. The main purpose of the paper is to discuss these comprehensive benefits which will enable to involve SaaS initiatives in Polish SMEs. Additionally, the paper presents the set of economic rules which clarify the importance of the cloud computing and related technologies for SMEs.

Keywords: cloud computing, software-as-a-service, small and medium-sized enterprise, economic rules for SaaS adoption.

1. Introduction

There are around 23 million SMEs in Europe representing around 99% of all businesses, and 57% of them are sole proprietorships. They employ two thirds of total private-sector employment and produce more than half of the EU gross domestic product [http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/pdf/dgentr_annual_report2010_100511.pdf]. Poland has a similar proportion of SMEs in the economy as other EU countries but surely there are various differences between business conditions of Polish SMEs and their equivalent firms from Western Europe. The figures presented here show that small businesses should also contribute to the development of the most advanced IT solutions. It can be noticed that contemporary information technology (especially Internet technologies) helps them be more effective to achieve desired outcomes.

Cloud computing is a frequently discussed phenomenon in recent years and it has been perceived as an alternative to owning and managing one's own information technology resources, such as hardware, software platforms, software applications and data. Simply, the term "cloud" can be recognized as a synonym of the global network:

Internet. Based on Gartner's worldwide survey cloud computing is recognized as a one of the most important technology priorities for CIOs [Gruman 2010]. From consumers point of view, cloud computing is primarily a new business paradigm, where a cloud vendor makes mentioned resources available to its customers. Based on a literature review, several models of cloud computing can be distinguished. In this paper, we focus on one of the most important kinds of cloud computing: Software as a Service (SaaS).

With contemporary Internet technology it is possible to use software application delivered by any distant provider and SaaS is an example of the new approach to mass computing, which can be an alternative to the current information system paradigms. The SaaS model of computing seems to be especially attractive for small and medium-sized enterprises owing to their limited resources of capital, people and knowledge. Furthermore, this model of computing has a strong economic justification that is widely presented further. The main purpose of the paper is to discuss these comprehensive benefits which will enable to involve SaaS initiatives in Polish SMEs. Additionally, this paper discusses the set of economic rules which clarify the importance of the cloud computing and related technologies for small and medium-sized enterprises.

2. SaaS characteristics

The idea to provide customers with a computer application via Internet is not new and it gained popularity as an Application Service Provider (ASP) model. First ASPs solutions were usually dedicated to specific applications such as ERP, CRM, e-commerce, etc. and they based on existing architecture and next generations of ASP have worked with originally designed environment and advanced integration [Gupta, Herath 2005]. According to Herbert "SaaS differs from ASP because the latter typically refers to applications built in client-server, single-tenant architecture that are being exposed to customers as an on-demand service, often by a third party rather than the vendor that created the software" [Herbert, Dent 2007]. These days, the shift from ASP model to SaaS model usually is connected with a new developed software tools, mainly Service Oriented Architecture (SOA). Software as a Service (SaaS) is a model of cloud computing, which is defined by Gartner as a "software that is owned, delivered and managed remotely by one or more providers" [www.cmswire.com/cms/enterprise-cms/gartner-saas-is-hot-revenue-will-keep-rising-003397.php]. Chappel distinguishes three parts of modern application platform [Chappel 2008]:

– A foundation. It concerns a software that manages the computer fundamental resources, such as: internal and external hardware components, standard libraries, software applications, etc.
– A group of infrastructure services. First of all it concerns such basic components as remote storage, integration services, identity services, etc.

– A set of application services (e.g. SaaS). This part includes both applications to provide external services and other supporting applications.

A sample of SaaS architecture is presented in Figure 1. This exemplary architecture mainly consists of the following components [Bedin 2007]:

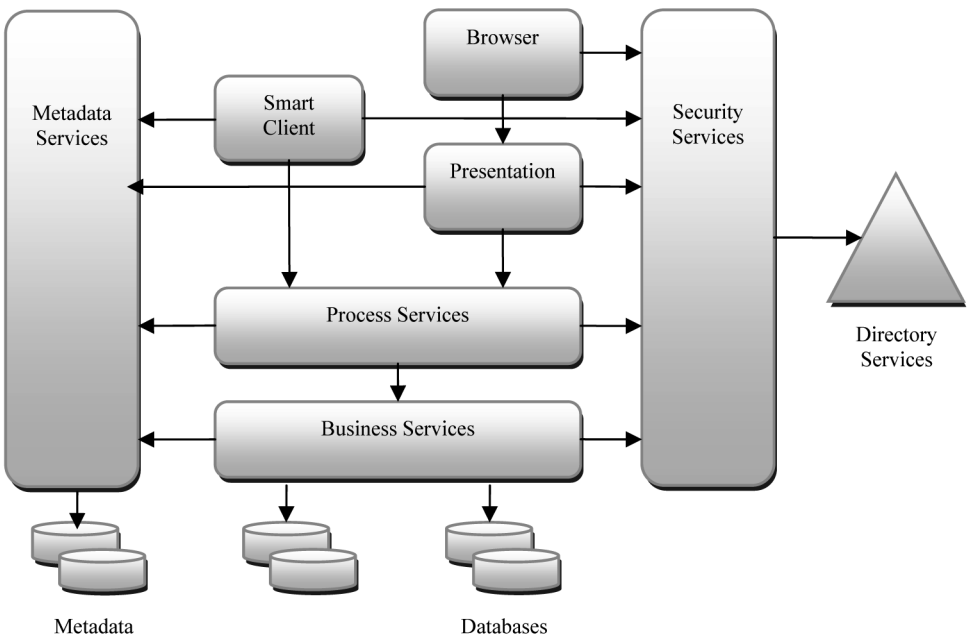

Figure 1. Sample of SaaS architecture

Source: adaptation from [Bedin 2007].

– Metadata services. Are used to provide different functions for different customers based on proper customization. It makes it possible to gain multi-tenancy feature.
– Smart client. This architectural element differs from thick and thin clients and is characterized by the following features: utilizes local resources; uses Web services; operates both online and offline; intelligent installation and updates.
– Process services and business services. These components are responsible for applications' logic that especially enables users to operate real business processes and workflows.
– Security services. This component of architecture is used to ensure that users' data are secure both in transmission and storage. The quality of these services determines users' confidence to the SaaS application.

According to Herbert, a software-as-a-service applications appear firstly in "fairly standardized and commoditized" business domains, like HR, recruiting,

CRM or IT management. Herbert states that there are less popular areas for SaaS implementation (like SCM software), because of their complexity, customization needs, deeper specialization [Herbert, Dent 2007]. There are developed SaaS applications as an open source type. This type of SaaS first of all concerns CRM, CMS, and internet shops.

3. Essentials of SaaS economics

The idea of outsourcing IT resources and processes is widely practiced in SMEs, but enterprises discover it is hard to trust third parties to manage their data, applications, networks, computers, and people. The software as a service model seems to be a good example for these dilemmas. Shapiro and Varian state that technology changes, but economic laws do not [Shapiro, Varian 1998, p. 2]. They point out that the main difference between industrial and information economy is that the old economy was driven by economies of scale and the new economy is driven by economics of networks [Shapiro, Varian 1998, p. 173]. To understand the software-as-a-service economics, it is very useful to analyse the general rules that are related to information goods economics and network economy (see [Shapiro, Varian 1998]):

Information good absorbs relatively high fixed costs with relation to low marginal costs. It can be said that an information product is costly to produce but cheap to reproduce. To produce first version of a complex software, it must bear significant costs, including labour, computer equipment, energy, office, external services, etc., and in order to generate and sell the next copy of the final software product then usually a data storage medium is needed. For this reason, the information goods should not be priced by their variable costs, but based on their demand level. Competition between sellers of information products can drop prices to nearly zero.

Information products are called *experience goods*, if consumers must experience them to estimate their value. This economic principle often complies with new software products, where various software properties are assessed by potential users for making decision regarding its purchase.

When purchasing information goods it is necessary to take into account future costs of switching technologies in order to avoid the lock-in effect. Let us take an example of business software used on Unix platform. When the time comes to exchange this software for another one, working only with Windows, then it can be necessary to spend money on new computers, services, training, and complementary software. The substantial switching costs can significantly lock us into Unix software, trigger lock-in effect off. Lock-in appears when users purchase various complementary software, dedicated to specific operating system. It should evaluate costs on life-cycle basis and select with small switching costs to prevent the lock-in effect.

Information technologies (e.g., Internet-based initiatives) are susceptible to the network effect. It arises "when the value of a product to one user depends on how

many other users there are" [Shapiro, Varian 1998, p. 13]. The network business growth is stimulated by demand side economies of scale caused by network effect. The main goal for this growth is to put a lot of effort into obtaining critical mass of clients. For this purpose, it can be profitable to gain business partners from among suppliers, complementors, customers, or competitors, to create strategic alliance. Information product markets are susceptible to strong network effect, hence the challenge for network businesses is to show their product as a future standard.

Internet solutions are susceptible to positive feedback, because their long lead times with followed rapid growth. It depends on amount of users: the more, the better. More satisfied users can attract other clients and the network becomes larger.

The economic rules listed above are driving network business and the world of information goods. In our conviction, these rules are adequate for software-as-a-service solutions because of the following reasons. Firstly, the benefits of SaaS solutions result from the properties of the network economy. Secondly, the nature of the SaaS business model is strictly digital, which means that these services can be perceived as an information products or more generally as an information goods, which are an essential subject of market exchange in the network economy. Thirdly, SaaS solutions are *experience goods*, because users must experience them to estimate their value for their organization. Fourthly, IT managers have to remember that investing in software-as-a-service is connected with important risk of future costs of switching technologies in order to avoid the lock-in effect. Fifthly, software-as-a-service solutions are susceptible to the network effect. The value of a SaaS product to one organization depends on how many other organizations there are. The growth of SaaS providers is stimulated by demand side economies of scale caused by network effect. Sixthly, SaaS products are susceptible to positive feedback, because of their long lead times with followed rapid growth. More satisfied users attract other clients and the network for SaaS solutions becomes larger.

One of the most important questions in the SaaS economics is how to price these services. Generally, market price of SaaS services should be determined by supply and demand for them. To construct models for pricing the SaaS services, the influence of the network effect should be considered (see Figure 2).

Figure 2 shows that when the cost is high, the only equilibrium is determined by the size of market equals zero, and the other equilibria are possible when the cost goes down [Varian 2002]. According Gupta and Herath, there are the following pricing models for selling software services [Gupta, Herath 2005]:

Per-user model. This model is characterized by a flat-fee per user, which refers to single fixed fee for a service irrespective of usage or tiered fee structure. The first kind of fee is appropriate if all users do intend to use ASP application frequently. The second kind of fee is better, when only some of users want to access it many times a day.

Per-transaction model. In this model, a pricing structure includes rates for different automated processes or functions. The level of rates is determined by complexity of

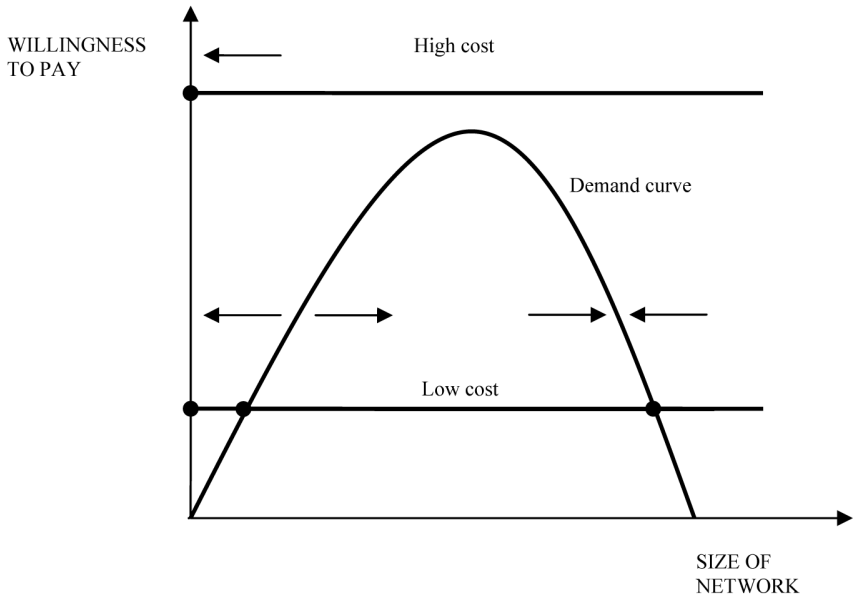

Figure 2. Cost adjustment and network externalities

Source: adaptation from [Varian 2002, p. 633].

function processing and volume of transactions. This model seems to be suitable for small business, because of variable service costs.

Percentage-of-revenue pricing model. Under this model, user's fee is dependent on changes in amount of revenue. It is in software providers' best interest to ensure service delivery, and to keep the system up and running, but it is important to prepare a service level agreement that covers proper performance and quality guarantees for user.

Fixed-fee model. In this model a monthly lump sum is paid, regardless of user's activities with the system. Service pricing can be based on amounts of used sites or system users.

All the pricing models named above can find application in pricing SaaS software, but today these software are also offered for free (e.g. web-based e-mails). It can be expected that more and more kinds of SaaS business software will be offered for free. Today, there are numerous examples of free business software in Poland, e.g., for invoicing or small accounting purposes.

4. Advantages and disadvantages of SaaS model for SMEs in Poland

However, the rules presented above are related to general concerns about SaaS economics, but to a significant extent these rules are practicable to the SMEs

conditions. First of all, small businesses are those that have not enough own IT resources and competences to ensure effective and efficient IT solutions. The SaaS model shifts responsibility for IT infrastructure toward the SaaS vendor. Traditional installed business software is costly, both in terms of the implementation and maintenance. According to Waters, with the SaaS the total costs of ownership (TCO) "are knowable, in advance, and contractually defined", and "usually dramatically lower because of the efficiencies that the vendor has in managing their own application in their own datacenter, for multiple customers" [Waters 2005]. Except for it, for managing small business expenses the other benefits of SaaS model are important (see [Waters 2005; Herbert, Dent, 2007]):

– Speed of deployment. In the SaaS model software services are available almost instantly, because the solution is prepared within the vendor office.
– Reliability. The level of SaaS vendor's IT competences usually is out of reach for a most of SMEs, therefore the reliability of software services can be guaranteed by vendor.
– Security, data safety, and disaster recovery. These features of information system practices are frequently difficult for small businesses to match internally. The SaaS vendor is the guarantee of software and data security.
– Automatic upgrade. Business applications are continuously developed and adjusted to meet law, business and management requirements. The business software upgrades are too important for operational stability of the software and they should be performed by experienced specialists.
– Scalability of solution. SaaS makes it easier to fit functionality of an information system, according to business needs.

Today, the cloud computing services are often free to the client, because of their near-zero marginal costs per consumer and long tail effect, but it applies to small software solutions (e.g. e-mail).

The SaaS model seems to be suitable for enterprises with limited IT resources, both material and human. Small and medium-sized enterprises are those which have not enough capital for IT investment and besides, they often have not enough knowledge to assess value and potential threads related to offered services. Herbert and Dent notice that "firms weighing the trade-offs between SaaS and on-premise solutions should make an assessment based on factors spanning four key dimensions: cost, benefit, flexibility and risk" and SaaS is often more expensive in the long run, with the breaking point occurring somewhere around year three. They also point at a risk concerning of loss of control over the system, "meaning a greater dependence on the SaaS vendor than with on-premise solutions" [Herbert, Dent 2007].

As was earlier mentioned, small and medium-sized enterprises are the important part of the Polish economy. According to Piątkowski, the main problems and barriers for SMEs development in Poland are as follows:

– the market barriers,
– the availability of financial capital,

– some problems as result of administrative, law and institutional barriers,
– the low level of knowledge and education managers and employees,
– inadequate information about availability of financial sources, binding regulations, market information (especially about European market),
– the opportunity to employ skilled workers and specialists [Piątkowski 2008].

The problems presented above point at an important conclusion: these days small and medium-sized enterprises in Poland have to deal with more existential problems than with an information technology infrastructure. However, implementing a proper information systems they may improve their ability to compete on the market. The SaaS model is a good way to help them develop the modern IT infrastructure at little expenses. Based on DiS, this model was developed in Poland by approximately 100 software producers in 2009, who offered over 200 softwares [http://www.egospodarka.pl/38474,Model-SaaS-oferuje-juz-100-firm-w-Polsce,1,39,1.html]. The present situation in Poland is characterized by an excess of supply over demand side of SaaS market. It seems to be the result of the initial stage of this market, but a cultural factor should be taken into account here. The structure of the Polish economy is not established yet. Today, after hardly twenty years of transformation, when the market and business experience of typical Polish small enterprises are different from counterpart companies in the old European Union, their level of susceptibility for risk connected with making their data available to another firms may be important factor to the SaaS model expansion.

5. Conclusions

The benefits and risks of SaaS solutions presented here should be taken into consideration by managers from SMEs who intend to implement a new information infrastructure in their business. The cloud computing technology is undoubtedly at the initial stage of development and mentioned risks can be avoided along with the growth of the vendors' reliability and technology capability.

The financial and market standing of the small and medium-sized enterprises in Poland determines their behaviour on the IT investment field. On the one hand, they have to deal with existential problems, but on the other, with an advanced information technology they have a chance both to reinforce their financial stability and join the world of global economy. In order to understand the software-as-a-service economics, managers from SMEs should be aware of the general rules that are related to the economics of network and they should answer the questions:

– What is the structure of costs that comes with SaaS model (fixed costs versus marginal costs)?
– What will be level of future costs of switching technologies in order to avoid the lock-in effect?
– How to obtain a critical mass of clients in order to take advantage of economies of scale caused by network effect and positive feedback?

– What the model of pricing SaaS is appropriate for our business?
– What kinds of risks do we face implementing SaaS model, and how to minimize their effects?

It is important for SaaS customers to consider penalties for the poor quality of vendor's services, especially related to crucial applications or functions. Gaining such guarantees is presumably difficult for small enterprises, but on the other hand, there is a danger that poor software services may have adverse effect on operational stability. However, SaaS model may imply some problems and risks for small businesses, but its positive effects for the economics of small and medium-sized enterprises in Poland appear unquestionable.

References

Bedin W. (2007), *An Overview of Software as a Service in Retail*, Microsoft Corporation, http://msdn.microsoft.com/en-us/library/ bb507203.aspx.

Chappell D., A Short Introduction to Cloud Platforms, Microsoft Corporation (August 2008), http://www.davidchappell.com/CloudPlatforms--Chappell.pdf (accessed 24.07.2010).

Gruman G. (2010), CIO priorities shift to lightweight services, virtualization, *InfoWorld*, January 19, http://www.infoworld.com/d/adventures-in-it/2010-cio-priorities-shift-lightweight-services-virtualization-453.

Gupta A., Herath S.K. (2005), Latest trends and issues in the ASP service market, *Industrial Management + Data Systems*, Vol. 105, No. 1/2.

Herbert L. Dent A. (2007), When Software-as-a-Service makes sense, *Supply & Demand Chain Executive*, February 1.

Piątkowski W. (2008), Bariery rozwoju małych i średnich przedsiębiorstw, http://mikro.univ.szczecin.pl (accessed in May 2008).

Shapiro C., Varian V. (1998), *Information Rules*, Harvard Business School Press, Cambridge, MA.

Varian H.R. (2002), *Mikroekonomia. Kurs średni – ujęcie nowoczesne*, Wydawnictwo Naukowe PWN, Warszawa.

Waters B. (2005), Software as a service: A look at the customer benefits, *Journal of Digital Asset Management*, Vol. 1, No. 1.

Websites

http://www.cmswire.com/cms/enterprise-cms/gartner-saas-is-hot-revenue-will-keep-rising-003397.php (accessed in March 2009).

http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/perfor-mance-review/pdf/dgentr_annual_report2010_100511.pdf (accessed 24.07.2010).

http://www.egospodarka.pl/38474,Model-SaaS-oferuje-juz-100-firm-w-Polsce,1,39,1.html (accessed 24.07.2010).

SOFTWARE AS A SERVICE: POSZUKIWANIE WARTOŚCI BIZNESOWEJ DLA MŚP W POLSCE

Streszczenie: Rozwiązania SaaS stanowią obecnie ważny przedmiot zainteresowania zarówno badaczy, jak i praktyków gospodarczych. Dzięki używaniu współczesnych technologii internetowych możliwe staje się korzystanie z aplikacji udostępnianych przez odległego dostawcę. Powszechne wykorzystanie rozwiązań typu SaaS w małych i średniej wielkości przedsiębiorstwach (MŚP) wydaje się kwestią czasu. MŚP w Polsce charakteryzuje ograniczony kapitał inwestycyjny, który mógłby wspierać ich infrastrukturę informatyczną. Głównym celem artykułu jest podjęcie dyskusji na temat takich zasadniczych korzyści z implementacji rozwiązań SaaS, które są w stanie skłaniać polskie MŚP do podejmowania inicjatyw w tym obszarze. Ponadto, w artykule zaprezentowano reguły ekonomiczne, które uzasadniają znaczenie technologii typu "cloud computing" dla małych i średnich przedsiębiorstw.