

Cost and quality factors in comparing SaaS to traditional hosting models

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Abstract

This paper provides an examination of the cost and quality benefits of SaaS. The focus is on small and midsize enterprises (SME's). Drawing from a literature review and expert comments I create a table of the most important issues that companies should take into account when estimating the benefits of SaaS for their organization. It can be concluded that cost is often overemphasized as a benefit and that more focus should be made on understanding the productivity and quality benefits of SaaS.

1 Introduction

Globalization increases the need for virtual collaboration. At the same time, consumers are getting used to the instant and easy connectivity of the web. At the same time as these consumers are getting used to the usability they are experiencing on the web, they are getting increasingly frustrated with the tools that they are offered at work.

The difficulty of creating flexible and usable tools is accentuated in SME's. SME's often don't have the resources to create customized applications. It is also costly to integrate applications and the maintenance of integrated applications might prove difficult. As the workforce is getting used to accessing their applications on the web at anytime and anywhere, companies applications are often cumbersome to use remotely.

It has been argued that these difficulties of cost, skills and technology can be improved by Software-as-a-Service (SaaS). The SaaS model means that an application is maintained, upgraded and run by a hosting provider. The application is accessible through a web-browser and can scale automatically. The application is said to be hosted on the "cloud". The user of the application doesn't have to take care of anything related to the application, only using it in the most productive way. Even integration with other applications can be offered on the cloud.

There are however several things to take into account in these arrangements. Companies that are used to more traditional servicing models will be concerned about security and reliability. There are also some automatic user benefits. For example, information doesn't have to be shared through file-sharing, but users can have access to the same information at the same time.

Another evident benefit for the user is the mobility. To access your business application, you only need a browser and connectivity to the internet. Usually mobile access is also possible.

Although these topics are very timely for many companies today, there is a lack of literature that would summarize the key issues to take into account when comparing a SaaS solution to traditional hosting models.

2 Objective of the analysis

The objective of this paper is to provide a basis of variables that needs to be taken into account when choosing between various application servicing models. In addition, an example calculation will be made to compare a simple service.

Because of the lack of scientific evidence, a share of the information presented in this paper will be taken from whitepapers by vendors and comments on vendors' websites. Also information on actual usage will be gathered from the web, from companies' homepages and blogs.

First, I will shortly describe the most discussed business benefits and obstacles to adoption.

Second, scientific papers on SaaS will be reviewed and the results of the findings will be presented.

Third, to get a more practical viewpoint, vendor whitepapers and blogs will be followed to create a wider view of the possible variables to take into account.

The focus will be on finding the possible variables that influence the choice between SaaS or another model. These variables will then be discussed later in the paper.

A conclusion will be made from the found variables and then an example calculation of mail services will be made. The calculations will be made between Microsoft Exchange In-House, Microsoft Exchange Hosted and Gmail SaaS.

3 SaaS in literature

3.1 Important drivers to adoption

The rising adoption of SaaS in industry has been connected to the recession. However, even if the adoption rate has grown during the recession compared to traditional servicing models, the growth of SaaS has been predicted already earlier. According to Forrester research, the adoption

of SaaS rose by 58% between 2006 and 2007. In 2006, the economist predicted that adoption will grow at 50% per year. (Economist, 2006) There are several benefits of SaaS that are important when companies are trying to cut costs, not least the more predictable cash out-flows that SaaS provides. (Comm.News, 2008)

Communications News reports on the findings of Forrester Research on SaaS. According to Forrester Research, there are benefits that are especially appealing to companies during recessions; less up-front costs, allowing buyers to prove the value of the software before committing to it, and shift a significant amount of the risk to the SaaS provider. SaaS offers benefits in any economic climate, but SaaS offers even greater value in downturns because of the more flexible investment. The benefits identified by Forrester Research expert Liz Herbert are:

Reduced up-front costs and a more predictable cost over time. No big investments have to be made in up-front licenses and hardware. A lot of the risks concerning the long-term are also transferred to the service provider, such as hardware failure and maintenance cost. The buyer doesn't have to be afraid of spikes in costs when upgrading either.

Prove the value of the software and continue to demand value from the SaaS provider. SaaS offers often give the possibility of a free trial for a limited period of time. In addition, because of the ongoing relationship and lower switching costs, the buyer has better opportunities to continue demanding value throughout the relationship.

Offloading risk to the SaaS provider. Because the infrastructure is the responsibility of the provider, some of the risks will be transferred to them. However, the buyer assumes the risk of the provider not having adequate measures in place. Thus the risks regarding security, backup, recovery and performance are in the hands of the provider.

In addition to these benefits, Forrester Research states that companies should take the following possible pitfalls into account when estimating SaaS:

Long-term cost of ownership. SaaS can become more expensive than In-House on the long-term.

Hidden costs. Some SaaS providers charge extra costs for example for exceeding limitations (for example data storage limits). In addition, there are other factors to take into account as well, such as bandwidth costs.

Too many niche SaaS applications. Many SaaS applications provide only one functionality, and companies run the risk of having a lot of small applications around the organization which will then be difficult to integrate and supporting end-to-end business processes becomes difficult.

One primary benefit of SaaS is identified in an article by Levack K in “Will SaaS Emerge as a Big Winner Postrecession?” (Levack, 2009). Levack notes that because the buyer isn’t paying a big up-front cost to the seller, the seller is committed to a more long-term relationship and thus needs to focus more on the customers. The customer stays in power and the provider has to ensure that the customer is always getting value from it.

This business-model benefit goes beyond the simple cost benefits. There will be different motivational factors driving SaaS providers and traditional application providers. Traditional application providers will have to make sure that they can convince the customer up-front, whereas SaaS providers have to make sure that the customer will be satisfied with the product for as long as possible. From a customer point of view, the SaaS offering is much more powerful. However, it also makes the cost issue more important since the benefits are clear.

The long-term costs and other risks have raised scepticism towards SaaS. The main concerns of sceptics are the Total Cost of Ownership (TCO), integration, security and performance (Comm.News, 2008). Another Forrester research quoted in the article found that only 4% of SME’s preferred a SaaS solution and 63% preferring an in-house solution (Forrester Research, 2007). On top of integration issues, the complexity of the pricing models was also a primary concern of the SME’s. SaaS vendors are offering different pricing options for different functionalities and support, and since it is difficult to estimate the needed level of service, it will also be difficult to calculate the actual costs.

The University of Florida conducted a one-year experiment with SaaS. According to their experience, predictable costs is one of the benefits of SaaS, in addition to increased bargaining power, ability to switch across providers and up-to-date software. (Foley, 2004)

3.2 *Quality: SaaS vs. Perpetual Licensing*

Choudhary examines the providers’ incentives to invest in software quality in the SaaS model and the traditional perpetual licensing model. (Choudhary, 2007) By modelling how new software functionalities are disseminated in both models, Choudhary demonstrates that the incentives to invest in development will be higher in the SaaS model, thus leading to better

software quality. The conclusion is that the software publisher earns higher profits and social welfare is higher under SaaS under these conditions.

3.3 ASP vs. SaaS

“The ABC’s of ASPs SaaS” is an article by Ken Anderberg where he has copied an article from ten years back about Applications Service Provider (ASP) providers. (Anderberg, 2008) It is noticeable that the same issues that were discussed ten years ago about ASP’s are today discussed about SaaS. ASP’s were seen as game-changers in the software industry. It remains to be seen if SaaS can actually create a big change, as ASP’s have not been able to live up to the expectations that were set for them. Anderberg highlights the drivers behind the change to ASP’s and SaaS:

- Shortage of skilled workforce
- Need for fast deployment of IT services
- Anxiety over electronic commerce opportunities
- The rapidly morphing technology field, where new products and processes pose training and budget dilemmas for end-users.

These issues are similar for SaaS as for ASP’s although there are other drivers pushing for the adoption of SaaS as well.

Anderberg also highlights that in both ASP and SaaS, big changes are required from IT departments. The benefits will be shifting workforce to more core capabilities, and the biggest question marks remain security and reliability.

Similar hopes of IT benefits have been put on ASP and SaaS. From this literature review we can see that there are other, even stronger drivers that are pushing the adoption for SaaS than there were pushing for ASP’s. According to Choudhary (Choudhary, 2007), the ASP model does not demonstrate the same benefits as SaaS because of the fact that ASP providers do not add features to the software and their core competence is in providing a reliable server service, not in providing application specific expertise or development.

3.4 Pros and Cons of SaaS according to literature

In the following table I have gathered the pros and cons of SaaS according to the discussion that was had above. The pros and cons have been grouped according to whether the impact will be

mostly on costs or quality. There is a thin line between the two and the distinction is difficult to make. We can notice that there are significantly more variables that can influence the quality of the service. However, the quality issues will also if realized have an impact on either cost or revenues.

	Pros	Cons
Costs	C1 Reduced up-front costs C2 Predictability of costs C3 Offloading risk to the SaaS provider C4 Pay only for what you use	Long-term costs Hidden costs (extra charges, bandwidth)
Quality	Q1 Better Buyer Power Q2 Less skilled workforce need Q3 Faster deployment Q4 Ability to cope with fast changes in technology Q5 Shift towards core capabilities Q6 Proving the value of the solution Q7 Better software quality Q8 Up-to-date software Q9 Reduced switching costs Q10 Scalability Q11 Long-term Relationship	Big changes for IT departments Security Backup Recovery Performance Too many niche SaaS applications Difficulty of End-to-End view Difficulty of Integration

4 SaaS according to Vendors and usage experiences

This section where I have collected information about SaaS from vendor whitepapers, vendor's blogs and users blogs can be considered experimental. However, I believe that because so little empirical research has been done on the effects of SaaS, it is important to also include a non-scientific part, where some subjective opinions about the subject can be analyzed. In the conclusions, I will compare the differences between the variables found in the literature and journal articles and the variables found from more "experimental" sources.

GXS insights is a technology research company. They are also helping their clients in SaaS, and have compiled a collection of benefits. According to GXS, the benefits of SaaS are the following (Morley, 2009):

Ease of switching vendors Because there are no sunk costs into licenses and hardware, it is possible for SaaS clients to switch vendors easier than it would be in a traditional model.

Pay only for what you use. When a company grows rapidly, a SaaS application grows automatically with the number of users. In addition, the user doesn't have to pay for any idle time or capacity: only for what is used. This can lead to significant economies of scale on the vendor side, since usual data center utilization rates are around 20% (McKinsey, 2009).

TCO is known. The total cost of ownership can be estimated more accurately with SaaS.

Fast Time to market. SaaS deployments usually require only sign-up to be fully functional, the servers are in place and customization is limited.

Easier upgrades. The upgrades and patches are automatically in use for all the users from the provider side.

Supply track is a vendor of a SaaS SCM solution. In addition to the benefits discussed above, Supply track also includes the following benefits to SaaS:

Zero Infrastructure. The overheads and investments in infrastructure are not needed in SaaS.

Improved Security. SaaS providers can invest in security and network infrastructure in a way that would be overkill for most organizations, hence the level of security will be higher.

Salesforce.com is amongst the most successful SaaS providers. The core of the Salesforce.com offering is their CRM solution, which has also been extended by other 3rd party applications and the Force.com Platform as a Service (PaaS), which provides developers and ISV's the opportunity to develop their own SaaS offerings on the Salesforce.com platform. Salesforce.com add **Seamless Integration** as a benefit of SaaS compared to traditional solutions. They claim that the true SaaS services provide API's that let you easily integrate to ERP's or other business critical applications.

CSC is a business service and solutions provider. They also consult their clients on SaaS related issues. CSC adds **scalability** and **IT department focus** to the list of benefits of SaaS. When the burden of maintenance is offloaded to an external SaaS provider, the IT department will have the opportunity to focus on more strategic initiatives.

In interviews conducted by IT Business Edge (All, 2007), CIO's from software providers cite the benefits they have achieved through implementing SaaS. CIO of SurfControl, a SaaS provider themselves, says they have been able to recruit new talent that specifically want to work on a SaaS platform. After adopting SaaS, their developer team has evolved into a creative problem solving team compared to when developing their home-grown solutions. There might

be resistance to change however, from the developer side. A big change in mindset has to be done from the developers' viewpoint to let go of the home-grown application that is developed from scratch compared to extending someone else's platform.

Trumba, a SaaS calendar provider, has also included the usual worries that companies have when adopting SaaS:

Security. The most common concern about SaaS is letting important information reside on outside servers.

Accessibility. Because someone else is in charge of keeping the software accessible, it is a common concern that at a critical point in time, it will not be.

Losing control of data. Letting all your critical data reside on an external server also raises the question of whether a company can still be in control of that data, and whether it will be reusable.

These are common concerns that have to be taken into account when choosing any software vendor. A SaaS provider has to go through a more serious due diligence to make sure that it can deliver what it promises since the risks can be significant.

4.1 Conclusion - Pros and Cons of SaaS according to vendor information

Not surprisingly, the vendor information on SaaS doesn't include an as broad discussion of the cons of SaaS as the academic literature and journal articles. Some of the same drawbacks can be identified, all in terms of the costs, and some more benefits are identified as well. The additional benefits that were discussed above are:

1. E1: improved security
2. E2: Seamless integration
3. E3: Zero infrastructure
4. E4: More business problem solving for developers

Experimental		Pros	Cons
Costs	C1	Reduced up-front costs	High due diligence costs
	C2	Predictability of costs	
	C3	Offloading risk to the SaaS provider	
	C4	Pay only for what you use	
Quality			Big changes for IT departments

Q3	Faster deployment	Security
		Backup
		Recovery
Q5	Shift towards core capabilities	Performance
Q8	Up-to-date software/easier upgrades	
Q9	Reduced switching costs	
Q10	Scalability	
E1	Improved security	
E2	Seamless integration	
E3	Zero Infrastructure	
	More Business Problem Solving for	
E4	developers	

The additional benefits that have been uncovered from the vendor whitepapers run counter to some of the risks of SaaS discussed earlier. Security issues and integration have also been identified as drawbacks of SaaS. These issues would require a broader investigation, in this paper, I will only shortly comment on the arguments regarding these issues. Salesforce.com claims that through using Web Services, quick and easy integration can be enabled by using SaaS, hence making seamless integration possible. Regarding the security issues, many SaaS providers have some fundamental benefits over in-house operations (Trumba, 2007):

1. Equipment located at state-of-the art facilities for data centers.
2. 24/7 365 days a year security arrangements
3. Optimized infrastructure and virus protection
4. External and internal vulnerability scans by third parties
5. Periodic safe backups
6. Data encryption across all transactions

These factors might provide grounds for arguing that SaaS offers better security. However, when buying a SaaS solution, it can be difficult to estimate the vendors' capabilities in security issues. Therefore, some service level and recovery policy should be in place when turning to SaaS.

The observation that the programmers' role is shifted to a more problem-solving role when using SaaS would also require more investigation. On the one hand, customization of SaaS applications is often limited. On the other hand, programmers are able to concentrate only on business critical-issues such as integration and how to make the platforms serve the actual work being done better. The programmer must thus shift his knowledge towards a better

understanding of the business processes that the applications are serving. By understanding the needs of the business, the programmers can make sure that the measures that increase productivity the most can be taken.

In conclusion, the vendor provided information adds some interesting dimensions to the question of benefits of SaaS. These factors would require further study, in order to measure and verify the accuracy of the claims concerning:

1. Security
2. Seamless integration
3. More business problem solving for developers.

5 Example calculation of the cost benefits of SaaS – mail service

An example calculation to evaluate the cost benefits of SaaS was done in order to provide some practical examples of the cost differences of SaaS and in-house solutions. The target service that was chosen was email. Email was chosen because in today's economy, email is a business critical service that everyone needs to have. Because email is a commodity, the technical differences of email are small, and can thus be left outside the scope of the evaluation. Although email is a commodity, choosing the right model can still impact the cost of the email service. In this evaluation, only the cost of the service has been taken into account.

For the evaluation two different providers were chosen: Google's Gmail and Microsoft's Exchange Server (Outlook). For the email service, both providers provide roughly the same service. Both also integrate a calendar in the same bundle. Google also offers additional services in the same price, such as online document editing and collaboration and the ability to create sites. These additional services were not evaluated. The question the evaluation wants to answer is: "If my company wants a reliable email solution from Google or Microsoft, how much do the different service options cost?"

The Microsoft Exchange server can be chosen to be provided In-house or hosted. The in-house option includes the procurement of the necessary servers and licenses and the labor costs. In the hosted service the buyer pays a fixed monthly fee, similarly as in the SaaS model. However, in a hosted service, the client receives a dedicated instance of the application running on the provider's server. The Google Gmail service is a SaaS option. From the buyers perspective, the SaaS or hosted option should not have any significant difference, except for that in the SaaS model the hosting provider is also the developer of the software, hence a specialist, whereas in

the hosted option, the hosting provider buys the actual application from the software company. this issue was discussed earlier in the differences between ASP's and SaaS in section 3.3 "ASP vs. SaaS".

5.1 *The assumptions for the calculation*

The calculations have been made for 4 different scenarios:

1. Google Gmail SaaS
2. Microsoft Exchange Server In-house
3. Microsoft Exchange Server hosted
4. Microsoft Exchange Server In-house low labor

There are two different Microsoft Exchange Server options. The low labor one is calculated with an estimate of the lowest labor possible. The other, Microsoft Exchange server In-house is calculated with figures presented by Google. These were the only explicit numbers that could be found regarding the labor hours needed to run the mail service in-house. Since the numbers can be misleading since they are provided by a SaaS provider, all figures are presented and also the low labor option has been calculated. Additional information was also used, the raw data used as a starting point for the evaluation can be seen in appendix 1.

The calculations have been made for an organization of 100 people. The following table summarizes the assumptions and variables behind the calculations. (All values are per year except for wages which are per month and per hour as indicated)

	GMail	Exchange	Exchange Hosted	Exchange low labor
Users		100	100	100
Servers		0	2	2
cost per server		4000	4000	4000
Configuration hours (server setup, user account creation, etc.)		22	107	50
Hardware Maintenance hours		0	30	0
Software Maintenance hours		25	50	0
Facility Maintenance hours		0	20	0
Administration hours		60	500	0
IT maintenance monthly wage cost		3100	3100	3100

IT Administration monthly wage cost	4000	4000	4000	4000
Maintenance hour cost	32,9375	32,9375	32,9375	32,9375
Admin hour cost	42,5	42,5	42,5	42,5
Electricity Facility maintenance cost/hour	30	30	30	30
		1000		1000

The calculations that were made can be viewed in appendix 1.

The total cost of ownership was calculated for the different options for an 8-year period, which includes an investment in new hardware and licenses in year 4 for the in-house service. The calculations have been made as an investment calculation calculating the net present value of the investments with a discount rate of 12%. Figure 1 summarizes the result of the calculation.

Email Service: Google SaaS vs. Microsoft Hosted vs. Microsoft In-house

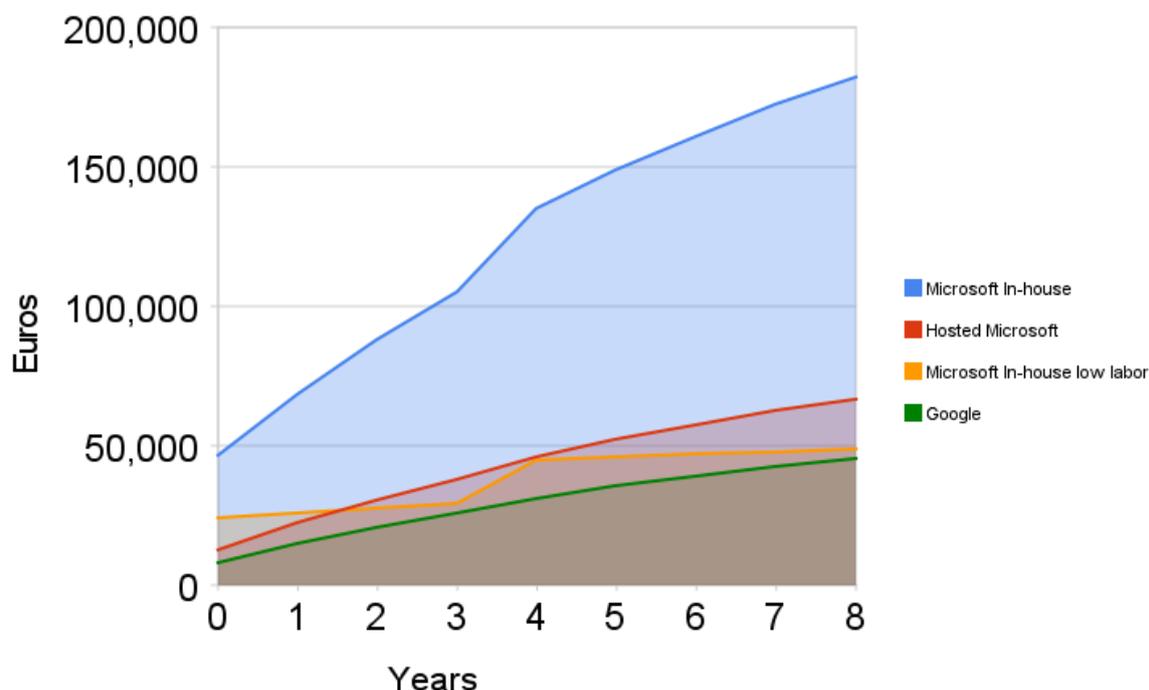


figure 1 Total cost of ownership for mail service

In figure 2, we can see how much each cost type influences the total cost in each option in a 4 year period. These values have not been discounted.

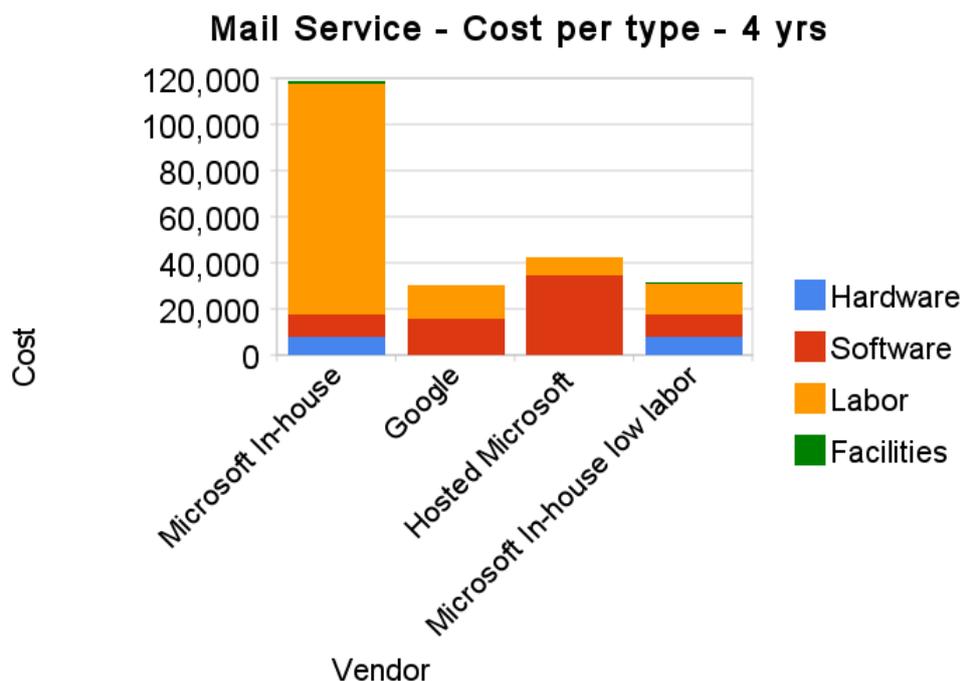


figure 2 Cost per type for the different mail service options

We can clearly see from the results that labor cost is the most important variable to evaluate when calculating the total cost of ownership of the different solutions. According to Google data, in-house hosting will be significantly more expensive than a hosted solution or SaaS. Because the variation can be so great, a SaaS solution provides some benefits because of known TCO. On the other hand, because of the variation and the fact that the costs of the service do not amount to a great part of the company’s total costs, costs should not be the main decision driver.

6 Conclusions and further research

In this paper, I have developed a table of the most important factors to consider when choosing between a SaaS, hosted or in-house service. The following table summarizes the findings.

	Pros	Cons
Costs	Reduced up-front costs Predictability of costs Offloading risk to the SaaS provider Pay only for what you use	Long-term costs Hidden costs (extra charges, bandwidth)
Quality	Q1 Better Buyer Power Q2 Less skilled workforce need Q3 Faster deployment Q4 Ability to cope with fast changes in technology Q5 Shift towards core capabilities	Big changes for IT departments Security Backup Recovery Performance

Q6	Proving the value of the solution	Too many niche Saas applications
Q7	Better software quality	Difficulty of End-to-End view
Q8	Up-to-date software	Difficulty of Integration
Q9	Reduced switching costs	
Q10	Scalability	
Q11	Long-term Relationship	
E1	Improved security	
E2	Seamless integration	
E3	Zero Infrastructure	
E4	More Business Problem Solving for the developers	

The conclusion of this paper is that the cost-side of the decision to use SaaS is often over-emphasized. The shift to SaaS will have implications on the processes of a company, and thus can lead to productivity and quality gains. These gains should not be overlooked and must be quantified. If the differences of choosing a SaaS solution are not taken into account, the implications for the organization might be negative. Therefore, all of the factors that have been identified in this paper should be taken into account.

The cost benefits of SaaS arise mostly from the productivity of the SaaS provider. The quality issues are more difficult to quantify, but the nature of the relation between the SaaS provider and the client will lead to higher quality (Choudhary, 2007). In addition, there are technological issues impacting integration which will influence quality, whether SaaS provides better or worse integration is a subject of another study.

I also conducted a sample calculation of the costs of a SaaS mail service compared to perpetual licensing. We can conclude that the labor costs will play a significant role in determining the total cost of ownership. However, because the productivity and quality aspects of SaaS are more important than the costs, more research should be done to understand the impacts of different quality factors of a SaaS implementation. It would also be critical to understand under which conditions SaaS offers better security than in-house or hosted and if the integration of SaaS solutions will bring productivity gains compared to traditional solutions.

This paper has not discussed the issue of resistance to adoption of SaaS. Even if research would point to significant benefits of adopting SaaS, there are still issues in organizations that need to be solved before SaaS can be implemented widely. Organizations and their workers will have to change the tools they are used to and maybe even change their working processes, thus the resistance to change will be significant.

This paper has limited scope and the example calculations have been based mostly on the researcher's own experience. The material for the paper has also been gathered rather freely and is not only based on audited research. However, I believe this paper can serve as a good basis for more detailed analysis of SaaS benefits, an issue that will also impact the direction in which SaaS should be developed and how it should be implemented for the biggest benefit.

7 Works Cited

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8 Appendix 1 Cost calculations

	GMail	Exchange	Exchange Hosted	Exchange low labor
Up-front cost				
Total server hardware cost (\$5,000 USD per server)		0	8000	8000
Microsoft Exchange Server Licenses		0	1118,4	1118,4

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Microsoft Exchange Client Access Licenses	0	6360		6360
Microsoft Windows Server Licenses	0	1118,4		1118,4
Microsoft Exchange Server Client Access Licenses	0	3200		3200
Typical software license discounts	0	20,%		20,%
Total Microsoft Exchange software licensing cost		9437,44		9437,44
Configuration labor cost	935	4547,5	2125	4547,5
Total up-front cost	935	21984,94	2125	21984,94
Annual Cost				
Google Apps Premier Edition license per user/ Microsoft Hosted Average Price	40	0	85,92	0
Yearly license cost	4000	0	8592	0
Hardware maintenance cost	0	988,125	0	164,6875
Software maintenance cost	823,4375	1646,875	0	329,375
Total maintenance cost	823,4375	2635	0	494,0625
Administration cost (patches, upgrades, client configuration)	2550	21250	2000	1062,5
Facility maintenance	0	600		600
Electricity		400		400
Total annual cost	7373,4375	24485	10592	2156,5625

Background for cost calculations:

Source	Cost type	Cost
http://wekti.com/2008/12/04/	CRM licenses	1000000 Up-front
	Servers,	250000 Up-front
	Opex,	60000 per month
		1310000
http://perspectives.mvdirona.	Workforce	4-10%
	Server hardware	dominant
	Data Center Infra	dominant
	Cloud provider	1,5
	Normal Power	2
	Utilization	10,% (goal: 35%)
McKinsey paper: Mckinsey discussion	Utilization	10,%
	Facility	20 M / MW
	Electricity	0,1 \$ Kwh
	Server	14000 /server (4 proc, 2
	CPU Equivalent	45 \$
One EC2 Compute Unit	labor	10,% labor cost
	CPU/month TCO,	107 \$
	CPU/month TCO,	43 \$
	CPU/month TCO,	96
	CPU/month TCO,	270
	Original FTE's	1700
	After FTE's	1448
	server/FTE ratio	35
	Facility utilization	65,%
	FTE	100000 \$/year

Sources for the calculations: