

A Survey of the Latest IT Trends of Cloud Software-As-A-Service

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Abstract—Software-as-a-service (SaaS) is an increasingly popular IT model and has become an IT trends. Yet, research on this topic is still rare in Indonesia. The purpose of this paper is to examine the latest IT trends of Cloud SaaS system using surveys and interviews as a research method to obtain data from 130 companies. Data was analyzed using descriptive statistics approach to measure the IT trends. Findings showed the willingness to consider traditional on-premise systems steadily decreased, whereas over the same time frame, the willingness to consider Cloud SaaS systems steadily increased. This study provides managers and academia with a critical insight into the latest IT trends Cloud computing and SaaS and contributes toward IT solutions.

Keywords—Cloud Computing, SaaS, On-Premise, IT trends

I. INTRODUCTION

The closing years of the first decade of the 21st century have seen a change in how companies approach, procure and manage business software. Traditional on-premise and server based software, known to be complex and expensive, has started to lose favor in the face of recessionary pressures. Accessing IT infrastructure, software, and data remotely over the web is now a requirement in the modern business environment, which increasingly demands flexibility and working in a wider network of customers, suppliers, vendors, and partners.

Cloud computing is one possible answer to the need for such flexibility, providing a highly automated, dynamic alternative for the acquisition and delivery of IT services. Today users are tapping into public and private clouds for computing resources and services without having to address the underlying technology. Companies are leveraging the massive scalability and collaboration capabilities of cloud computing to solve problems in ways that just were not possible before. They are deploying new services with greater speed and without additional capital investment.

Software-as-a-service (SaaS) is one of the cloud models when software is provided as an online service over the Internet in a scalable fashion. SaaS is a fundamentally different way of developing and delivering software solutions to meet users' rapidly changing requirements. Unlike many of the over-hyped technology trends of the past, SaaS is producing real business benefits for organizations of all sizes across nearly every industry, and threatening to reshape the software industry. The fact is that SaaS is perfectly positioned to respond to a "perfect storm" of market forces as:

- Economic forces driven by the downturn in the economy and uncertainty in the market
- Business forces driven by changing customer demands and escalating competitive pressures
- Technological forces driven by rapidly changing organizational and workplace requirements

What differentiates SaaS from previous technology developments which failed is that this round of innovation is producing tangible and measurable business benefits which are enabling organizations to respond to the forces above in a more flexible and economical way.

SaaS, also known as on-demand computing, utility computing, and hosted services is an increasingly popular IT model in which software is available to users as needed. The idea is basically the same: Instead of buying and installing expensive packaged enterprise applications, users can access software apps over a network, with an Internet browser being the only absolute necessity. Usually there is no hardware or software to buy since the apps are used over the Internet and paid for through a fixed subscription fee or per an actual usage fee. The SaaS model was developed to overcome the common challenge to an enterprise of efficiently meeting fluctuating demands on IT resources.

What is the forecast for enterprise IT? It could be cloudy. Clouds have moved in fast in recent years. Cloud computing is now recognized by even the largest companies as a practical, valuable model for migrating workloads and managing costs. On-demand computing is the new reality. Everyone is demanding and impatient – customers, employees, and managers who need to see better controlled financials and, at the same time, strengthened ability to bring new products or services to market to remain competitive. Over the past three years, we have been measuring the willingness of organizations to consider SaaS as the deployment model for their software such as ERP implementations. In that time, companies have become more educated on both the benefits and potential issues that factor into a SaaS software decision. As a result, the willingness of organizations to consider a SaaS or cloud deployment model for ERP has steadily increased. The research question that should be answered is: How is IT Trends of SaaS, how is the willingness of firms to consider Cloud SaaS systems options for their software implementation?

II. LITERATURE REVIEW

Cloud computing is a big driving force in the IT industry today. The cloud computing landscape continues to realize explosive growth. The worldwide public cloud services market was projected to grow nearly 20 percent in 2012, to a total of \$109 billion, with 45.6 percent growth for Infrastructure as a Service (IaaS), which is the fastest growing market segment [4]. Cloud computing also provides the social network infrastructure for innovators to share their ideas with the extended business community. Whether they are scientists, business analysts, software developers or entrepreneurs, innovators can collaborate more easily when they are working in a shared cloud computing environment. The connection between collaboration and innovation has been well documented.

A. Understanding the Terminology of Cloud Computing

Public cloud Computing is a model in which applications, storage and computing power are provided over the Internet as a service. Cloud computing can be defined in a simple terms as the delivery of a software product to a user via the Internet [7]. Clouds can provide rapid access to computing capacity at a lower cost of ownership, enabling companies to perform operations that may have previously been unaffordable or impractical. So it is no wonder that the research and development community is turning to cloud computing for their most data-intensive processing, modeling and analytic applications. Cloud computing delivers all the benefits of desktop and application virtualization, helps further reduce the cost, eliminates the need for investments to deploy the technology and shortens the implementation timeline.

Cloud computing is now recognized by even the largest companies as a practical, valuable model for migrating workloads and managing costs. Cloud computing helps increase operational efficiency as it relies on a high degree of standardization. There are several types of clouds: public cloud; private cloud; community cloud; Hybrid or multi-cloud solutions, but there only are three primary cloud solutions[9] as delineated in figure 1:

- **Public cloud:** We are all intimately familiar with this type of cloud infrastructure because we use it every day. Public clouds are open to any individual or company. They are Internet-based but “housed” with the provider, and they can be owned and managed as business enterprises, by government organizations and academic institutions – sometimes jointly. Public clouds are built by a cloud provider, and organizations effectively rent compute capabilities in a shared environment controlled and managed by that provider. And there are three main types of public clouds: SaaS, PaaS, and IaaS.
- **Private cloud:** Exclusively available to a single organization, a private cloud is designed to serve any number of business units or individual consumers that constitute that organization. Private clouds can be owned and managed internally or outsourced to a third party, onsite or offsite. Some enterprises prefer this concept because it keeps their data and computing resources entirely isolated.
- **Hybrid or multi-cloud solutions:** As the name implies, hybrid clouds combine two or more of the above scenarios, using either standardized or proprietary technology to cross connect them. Each service is like a Lego block; comprising a set of tools you can use to build your own unique cloud formation. The need to be more customer-centric is fueling corporate desire for hybrid solutions uniquely tailored for their enterprise. In fact, most large enterprises are choosing this multi-cloud approach, devising the combination of service and deployment models that work best for them. Over time, this could help reduce costs by promoting competition among providers, as well as keeping pressure on them to perform at the highest level.

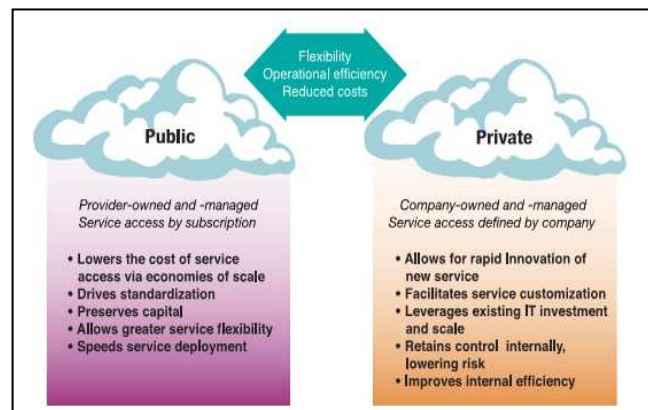


Fig. 1. Public, Private, and Hybrid Cloud Computing

Cloud computing is a big driving force in the IT industry today. The cloud computing landscape continues to realize explosive growth. The worldwide public cloud services market was projected to grow nearly 20 percent in 2012, to a total of \$109 billion, with 45.6 percent growth for Infrastructure as a Service (IaaS), which is the fastest growing market segment [4]. Cloud computing also provides the social network infrastructure for innovators to share their ideas with the extended business community. Whether they are scientists,

business analysts, software developers or entrepreneurs, innovators can collaborate more easily when they are working in a shared cloud computing environment. The connection between collaboration and innovation has been well documented.

B. Understanding the Terminology of SaaS (On-Demand) Model

SaaS, also known as on-demand is a software delivery model in which a software product is hosted by a company - such as SAP - on its servers and is accessed by customers via a Web browser [7]. SaaS is one of the cloud models when software is provided as an online service over the Internet in a scalable fashion. There is no need to maintain an in-house infrastructure with servers, storage, and network elements, and there is no need of an upfront investment. On-demand computing is the new reality. Everyone is demanding and impatient – customers, employees, and managers who need to see better controlled financials and, at the same time, strengthened ability to bring new products or services to market to remain competitive.

User access to applications over the Internet can be enabled from a service provider data center. Companies will need to bring their application licenses, while the solution overall will be offered as a service. Users will have a portal to access applications. After logging in, users will get access to the applications that are registered with the service for that specific company. The service can be sized based on the number of sales or business scale required; in essence, the maximum number of concurrent users. SaaS is one of public cloud systems, and there are three main types of public clouds:

- **Software-as-a-service (SaaS):** SaaS is a software delivery model in which a software product is hosted by a company - such as SAP - on its servers and is accessed by customers via a Web browser [7]. Consumers are empowered to use a provider's web-based application, with access via diverse devices and interfaces, but they have no contact or control over the application itself. A conceptual framework of SaaS as illustrated in figure 2. It is simply a way to sell and distribute software that uses the Internet. While definitions vary, this paper treats SaaS as a subset of cloud computing. For example, Amazon and Apple are promoting data storage "on the cloud," but the applications that use that data are stored on the device, updated regularly from the cloud (Internet). SaaS is a delivery model for software applications whereby Web-native applications are provided over the internet, which customers pay for using rather than owning [7].
- **Platform-as-a-Service (PaaS):** A computing platform (operating system and associated services) which is delivered as a service over the internet by the provider. The PaaS layer offers black-box services with which developers can build applications on top of the computing infrastructure. This might include developer tools that are offered as a service to build services, or data access and database services or billing services. Consumers can deploy enterprise-created or

commercial applications onto cloud infrastructure, retaining control over the applications [11].

- **Infrastructure-as-a-Service (IaaS):** Services that deliver computer infrastructure, typically a platform virtualization environment, as a service in the Cloud. Rather than purchasing servers, software, data center space or network equipment, clients instead buy those resources as a fully outsourced service. The service is typically billed on a utility computing basis and amount of resources consumed (and therefore the cost) will typically reflect the level of activity. It is an evolution of web hosting and virtual private server offerings. Consumers can replace physical equipment such as servers, storage and networking with cloud-based infrastructure, retaining control over operation but not the infrastructure itself [11].

A late 2010, Forrester Research survey found that a quarter of channel partners say they are already reselling SaaS, and a further 30% have plans to do so [10]. IDC predicts that over 2010-2014, SaaS will grow six times faster than traditional packaged software, reaching over \$40 billion in revenues by 2014 [10] as depicted in figure 3. It means that SaaS system has become IT trends since 2009.

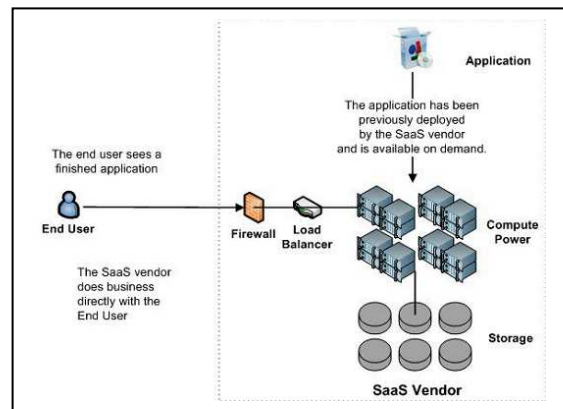


Fig. 2. Software-as-a-service (SaaS)

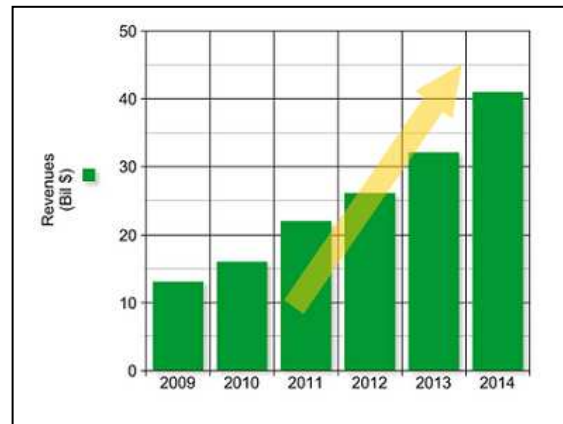


Fig. 3. Worldwide SaaS Revenues/Trends

C. *Cloud Software-as-a-Service (SaaS) VS Traditional On-Premise*

Before going forward, it is important to distinguish between the many ERP deployment methods organizations are using:

- **Traditional license On-Premise:** Software may be licensed for use on a particular computer, or by other criteria such as number of users. The license can be either on a term basis or perpetual, and is often treated as a capital expense. The software is located in-house.
- **SaaS or on-demand:** The software itself is not licensed or owned by the end user; it is provided as a service. It is often paid for on a subscription basis, and can be accessed from a normal internet connection. SaaS avoids a large upfront capital investment. This deployment method is often referred to as the Public Cloud.
- **Hosted:** Licensed applications are hosted by a third party. This deployment method may be in a separate instant on a separate piece of hardware (dedicated to an organization), or in a separate virtual instant (dedicated to an organization) where the application is housed by multiple companies. Sometimes this deployment method involves a Private Cloud, where the instant of ERP is hosted by a third party and then delivered to the end user on a subscription basis [10]

Enterprise resource planning (ERP) is an integrated suite of modules that forms the operational and transactional systems of record upon which any business is based [9]. With its roots in materials requirement planning (MRP), it is most ubiquitous in the manufacturing industries, but has truly expanded beyond these boundaries to become a mature business application that provides value to a far more extensive set of industries. ERP systems provide much-needed capabilities, such as management of finance, product/inventory, human capital, purchasing, and other transactional data within one environment.

A recent Forrester Research report claims that the analytics portion of SaaS will become highly important to the users of this software delivery model. Users will be also be looking for SaaS applications that can integrate social media with a company's other sources of information [5] According to the report, adopters of SaaS should also consider how their service providers can handle mobile apps.

D. *Advantages of Using SaaS*

Many companies find a number of advantages with using the SaaS model [7], including:

- **Initial affordability:** Companies that previously could not afford to purchase an ERP system—or another application—can now “lease” one on a monthly basis, avoiding the high cost of obtaining the hardware and software and hiring and training support personnel, thereby reducing their TCO (total cost of ownership). The lower cost to implement software provided through SaaS means that companies can explore

whether a particular software package will work for them without a large, up-front expense

- **Shorter implementation time:** The time required for implementation is usually shorter with the SaaS model as the user does not have to worry about the technical issues; the provider has servers, telecommunications systems, and highly trained personnel already in place. The SaaS provider handles all the maintenance, including execution of backups, training, and customizing of the system
- **Lower support costs and complexity:** Companies that make use of the SaaS model do not need to hire additional IT personnel to implement new systems and applications. SaaS providers can also run information systems more efficiently because they do it on a large scale; they can spread fixed costs over many users, thus achieving economies of scale that translate into a lower total cost of ownership. In addition, a SaaS provider usually has an easier time attracting, training, and retaining a talented workforce.

The end result is that the underlying feature-set of a multi-tenant SaaS model gets better every day, and each new deployment of the software dramatically increases the features/functions of the software. This is in direct contrast to most enterprise software models, where companies get frozen into an obsolete release because of the heavy customization required to implement it in the first place.

E. *Disadvantages of Using SaaS*

According to Monk [7], there are some potential downsides to using SaaS, and companies should consider these carefully before choosing a SaaS provider:

- **Security:** Companies using SaaS are turning their information systems over to a third party. A SaaS provider will typically have data from multiple clients on a single piece of hardware. Each customer's data must be shielded from other customers. Although this is a legitimate area of concern for clients looking to move to the SaaS model, the reality is that SaaS providers often have better security systems in place than many small companies do.
- **Bandwidth/response time:** The telecommunications channel from the SaaS provider to its customers must be fast enough to handle multiple users, and the SaaS must have sufficient hardware to provide the necessary computer processing capabilities.
- **Flexibility:** The SaaS provider should be flexible in working with its users and satisfying their requests for software modifications and enhancements.
- **No frills:** SaaS software providers can usually provide basic systems well, but asking for unusual configurations may cause problems, and the SaaS provider might not allow for third-party add-ons. Further, the provider might not want to develop custom software, or it may not be affordable for a small company.

- Technical, not business focus: A SaaS provider will understand the technical aspects of the software it is delivering, but it may not have sufficient business process knowledge, in which case the customer will need to define the business processes and make configuration decisions.

III. RESEARCH METHOD

CV. Omah IT (Jl. Tampak Bayan No. 89 Yogyakarta) is an IT Consulting & Software Research-Development, and Software Vendor. It has been in on-premise Software such as ERP, CRM, IS, SCM, SIRS, SPS, etc. since 2007 and SaaS or on-demand Model since 2010. CV. Omah IT has over 600 clients who are using its on-premise and SaaS. About 75% of its clients have purchased and used its software based on on-premise, and the rest 25% as SaaS users. This research was carried out at CV. Omah IT as a Software Provider and Vendor, and then proceeded to its 130 clients spread out to Yogyakarta and Jakarta for three years (2011-2013). Some of its on-premise and SaaS can be browsed, logged in, and seen in the following Web sites:

- Healthcare SaaS: <http://rumahsakit.sistem-informasi.com> (username: admin; password: farmasi)
- Education SaaS: <http://svn.omahit.co.id:81/sanur> (username: admin; password: admin)
- Café & Restaurants: <http://svn.omahit.co.id:81/dgree> (username: admin; password: admin)
- Inventory Management: <http://svn.omahit.co.id:81/inventory> (username: admin; password: admin)
- AIS & Financial Report: <http://svn.omahit.co.id:81/akuntansi> (username: admin; password: admin)

One of the examples of Public Cloud SaaS systems for Education designed and developed by CV. Omah IT is SMA Santa Ursula Jakarta as presented in figure 4. Instead of buying and installing expensive packaged enterprise applications, SMA Santa Ursula as a user can access CV. Omah IT's software apps over a network, with an Internet browser being the only absolute necessity. There is no hardware or software to buy since the apps are used over the Internet and paid for through a fixed subscription fee or per an actual usage fee. Fee IDR 15,000.00per student as an actual usage who has registered during the new semester each year.

These insights provide the analyst's perspective on the research as drawn from an aggregated view of research surveys and interviews to of 130 respondents, particularly in Yogyakarta and Jakarta for the years of 2011, 2012, and 2013 respectively. Data was gathered and based on interviews and surveys conducted by researcher/analyst on behalf of CV. Omah IT, but Omah itself did not participate in the interviews, which were independently conducted by researcher/analyst. Data collected during the surveys was analyzed using descriptive statistics as presented in chapter 4: results and analysis in order to answer the research question: How is IT

Trends of SaaS? How is the willingness of firms to consider SaaS as deployment model for their software implementation?

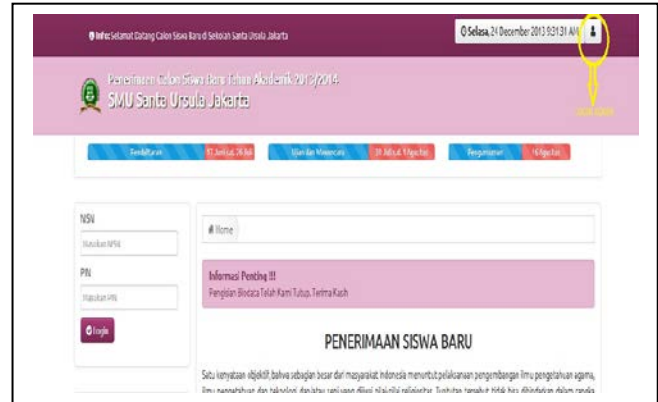


Fig. 4. Education - SaaS

IV. RESULTS AND ANALYSIS

Research results showed that there is further proof that Software On-Premise (such as CRM, ERP) deployment options are declining for the five sectors of Education, Healthcare, Café & Restaurants, Retails, and Manufacturing for three years of 2011, 2012, and 2013 respectively as illustrated in table I and graphic statistics 1. It has declined for three years from average 72% in 2011 to 60% in 2012, and then declined to average 47% 2013. Whereas, the result of the descriptive statistics showed proof that SaaS and Cloud options for the five business sectors of Education, Healthcare, Café & Restaurants, Retails, and Manufacturing for three years of 2011, 2012, and 2013 are trending towards higher and higher as illustrated in table 2 and graphic 2. The willingness to consider SaaS vs. on-premise ERP systems varies from industry to industry as delineated in table I vs. table II.

TABLE I. COMPANIES IMPLEMENTING ON-PREMISE

% of Respondents, n = 150	2011	2012	2013
Education	73%	61%	48%
Healthcare	71%	59%	49%
Café&Restaurants	65%	53%	41%
Retails	76%	62%	55%
Manufacturing	75%	63%	52%

versus

TABLE II. COMPANIES WILLING TO CONSIDER SAAS

% of Respondents, n = 150	2011	2012	2013
Education	31%	46%	58%
Healthcare	26%	41%	51%
Café&Restaurants	35%	51%	62%
Retails	23%	36%	48%
Manufacturing	22%	37%	49%

From 2011 to 2013, the willingness to consider SaaS and Cloud options steadily increased. It has increased from average 25% in 2011 to average 42% in 2012, and 55% in 2013 respectively (details can be seen in table 2 and figure 2). In particular, SaaS and Cloud Software solutions saw large gains as predicted by IDC presented in figure 3.

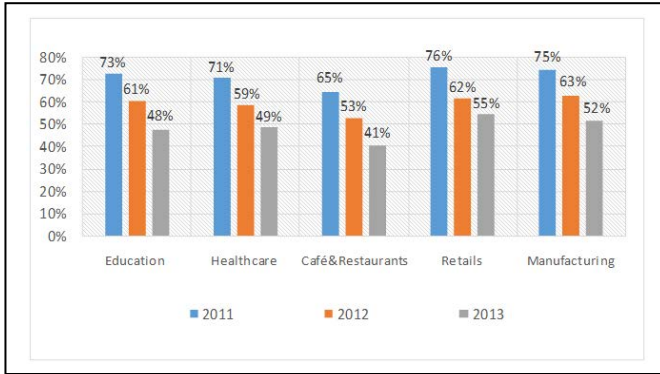


Fig. 5. Companies Implementing On-Premise (2011-2013)

Table I and figure 5 which describes the decreased of enterprises implementing on-premise is contrast with table 2 and figure 6 which shows to willingness of companies to use Cloud SaaS instead of on-premise in the near future.

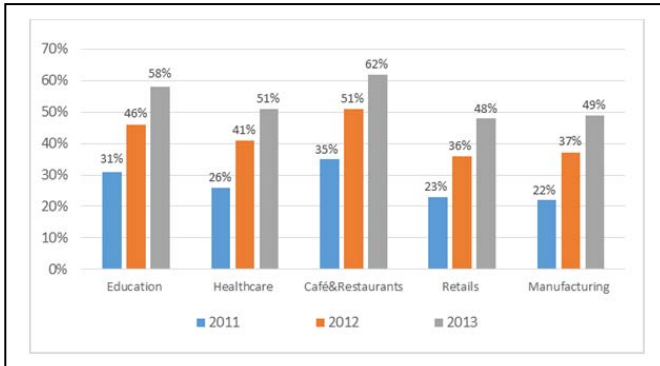


Fig. 6. Companies Willing to Consider SaaS (2011-2013)

Over the same time frame, the willingness to consider On-Premise solutions steadily decreased as depicted in table 1 and figure 1. The IT trends showed that this year 2014, that trend has continued declining for On-Premise solutions. Why could it be? In that time, companies or organizations have become more educated on both the benefits and potential issues that factor into SaaS and Cloud Software decision. As a result, the willingness of companies to consider a SaaS and Cloud options for ERP has steadily increased. At the same time the willingness to consider the traditional On-Premise model has steadily decreased. The idea is basically the same: There is no hardware or software to buy since the apps are used over the Internet and paid for through a fixed subscription fee or per an actual usage fee. Instead of buying and installing expensive packaged enterprise applications, users can access software apps over a network, with an Internet browser being the only absolute necessity. The SaaS model was developed to overcome the common challenge to an enterprise of efficiently meeting fluctuating demands on IT resources.

Over all, table III and figure 7 shows how the demand and willingness to adopt these IT solutions are contrast with each other each year for three years of 2011, 2012, and 2013 respectively.

TABLE III. THE WILLINGNESS TO CONSIDER SAAS VS. ON-PREMISE BY INDUSTRY

% of Respondents, n = 150	2011	2011	2012	2012	2013	2013
	On-Premise	SaaS	On-Premise	SaaS	On-Premise	SaaS
Education	31%	46%	58%			
Healthcare	26%	41%	51%			
Café & Restaurants	35%	51%	62%			
Retails	23%	36%	48%			
Manufacturing	22%	37%	49%			

It is predicted that eventually, deployment models of all types would become equally considered. While On-Premise deployments are still the overwhelming majority, they continue to fall out of favor. But this year's data shows that the demand for Cloud Solutions has slowed as well. Each deployment model has its unique pros and cons, but if all deployments are equally viable, how is an organization to choose between ERP solutions? This Analyst Insight examines trends in ERP deployment models and provides models and clues as to whether cloud ERP is the right fit for your organization.

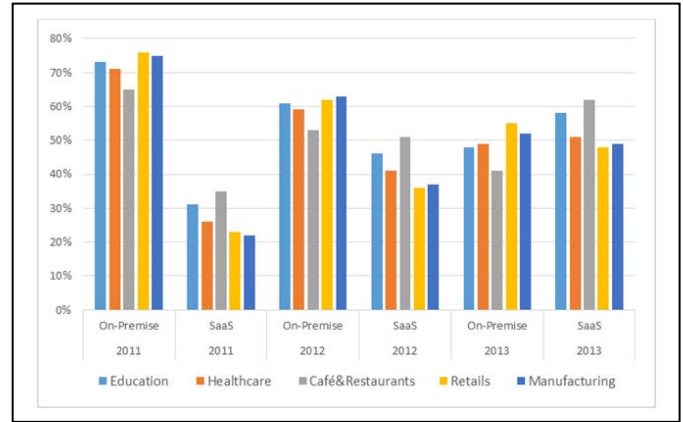


Fig. 7. Willingness to Consider SaaS vs On-Premise by Industry (2011-2013)

V. CONCLUSION AND PERSPECTIVE

The continuing demand for business expansion, profitability and an enhanced user experience is clearly accelerating the move to cloud computing. Cloud answers the enterprise's need to simplify and to use the best resources from the best devices, wherever they happen to reside on the network. For CIOs, it is an opportunity to reduce operational complexity and focus on delivering greater value to the organization. In just the next few years, we can expect to see more clouds gathering. The forecast calls for: "doing more with less; greater flexibility and scalability; faster speed to market; leveraging resources across the board." In addition, the

SaaS model was developed to overcome the common challenge to an enterprise of efficiently meeting fluctuating demands on IT resources. Why could it be? In that time, enterprises have become more educated on both the benefits and potential issues that factor into Cloud SaaS systems. As a result, the willingness of enterprises to consider SaaS and Cloud options for ERP has steadily increased. At the same time the willingness to consider the traditional on-premise model has steadily decreased. The idea is basically the same: There is no hardware or software to buy since the apps are used over the Internet and paid for through a fixed subscription fee or per an actual usage fee. Instead of buying and installing expensive packaged enterprise applications, users can access software apps over a network, with an Internet browser being the only absolute necessity.

When it comes to IT, it is no longer a matter of owning and operating everything ourselves. It is the results that count – availability, reliability, security and agility that support day to-day operations and corporate growth. Enterprise cloud computing can enable that in ways traditional IT arrangements cannot, and outsourcing further streamlines the process, keeping your people focused on their most important work. There are two main options for the deployment of business applications: in the cloud (such as SaaS) and on-premise. In reality, many deployments, upon closer examination, are technically a hybrid mix of the two options. In everyone's enthusiasm for the cloud, what often gets lost in the conversation is the fact that there are multiple types of clouds (public, private, and hybrid) and multiple cloud deployment options (hosted, software as a service [SaaS], and managed services), as well as numerous cloud services, including platform as a service (PaaS), infrastructure as a service (IaaS), and SaaS. An enterprise would, therefore, mature from focusing on SaaS at the application level to having all of the apps driving a given business process be hosted, delivered, and managed via the cloud.

With the inevitable emergence of the Cloud and growing usage by your competitors, you can't afford to not look at how Cloud services can benefit your business today. As discussed in this brief, moving to the Cloud does not require an all-or-nothing approach to your technical infrastructure. Companies can choose to implement a hybrid platform in which Cloud applications are connected with existing on-premise systems. This allows you to continue to maximize your investment in legacy systems while leveraging the Cloud to drive innovation and agility. With the right technology, capabilities and expertise, integrating a hybrid Cloud approach into your architectural framework can be the solution you need to stay competitive and viable—both today and in the future.

REFERENCES

The template will number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first ...”

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the reference list. Use letters for table footnotes.

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For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

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