

# Responsibility Towards The Customers Of Subscription-Based Software Solutions In The Context Of Using The Cloud Computing Technology

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**Abstract:** *The continuously transformation of the contemporary society and IT environment circumscribed its informational has led to the emergence of the cloud computing technology that provides the access to infrastructure and subscription-based software services, as well. In the context of a growing number of service providers with of cloud software, the paper aims to identify the perception of some current or potential users of the cloud solution, selected from among students enrolled in the accounting (professional or research) master programs with the profile organized by the Bucharest University of Economic Studies, in terms of their expectations for cloud services, as well as the extent to which the SaaS providers are responsible for the provided services.*

**Key words:** Cloud computing, SaaS (Software as a service), Service Level Agreement (SLA), Quality of Service (QoS), Cloud Accounting

## Introduction

In constantly changing economic and social environments, the complexities of decisional matters as well as the variety of the operational issues facing today's information society represent two items of resonance in the information technologies area. The variety of these technologies opens the way for approaches directed to methods and effective information management techniques, which lay the foundations for a new information paradigm, described by cloud computing technology.

The use of this technology leads to a new vision on how to get, exploit, store and use the information available in any company. According to 71 cloud computing technology experts, elected by decision of the European Commission to be part of an avant-garde "Expert Group" in the information technology area, the substantial changes that occurred in the information technology have been caused by the conflict among technical constraints imposed by strong need for more efficient data processing and storage equipment, IT infrastructure, and user requirements. Based on this statement, one can identify two major trends of change in the old paradigms governed by informational storage resources and computing power, such as: firstly, the demand and expectations of end-users, individuals, individual entrepreneurs (freelancers) and from business environment, and secondly, the available technology for storing and data processing.

The study "Hype Cycle for Emerging Technologies" conducted by Fenn and LeHong in 2011 reveals that the new information paradigm based on the "cloud computing" technology records certain latency in its application, the large-scale implementation

being deferred to a near time horizon.

Also, "A Roadmap for Advanced Cloud Technologies under H2020" Expert Group report (2012) identifies the expected main changes in IT environment for the next 10 years:

- 2014: the emergence of new storage and data processing resources;
- 2015: the intensive use of mobile devices and the spread of the Bring Your Own Device (BYOD) phenomenon;
- 2015 - 2018: it estimates that more countries will join social networks and begin to use cloud services;
- 2016: widespread use of devices and personalized services, the emergence of intelligent multimodal interfaces and intelligent use of virtual networks at the expense of physical networks;
- 2016 - 2020: all software resources are provided as services and use of large data.

According to "The Global Information Technology Report 2013 - Growth and Jobs in the hyper connected world" Romania is still behind most of EU Member States in information technology and communications field (IT & C), as it was ranked 75 out of 142 countries in The Network Readiness Index 2013 (NRI - the index that measures the tendency of countries to exploit the opportunities offered by IT & C). Although Romania was given a good score for infrastructure, it was penalized for the lack of a coherent governmental vision on "market and market regulation" regarding the development of IT & C.

More and more companies adopt ERPs taking into consideration the overall performance and strengthening governance. From this perspective ERP systems implementation are projects of strategic importance to

businesses. These projects involve major organizational changes and changes in management and information system (Mihai et al., 2013).

### 1. The challenge of the cloud computing informational paradigm

Garg et al. (2012) states that cloud computing has revolutionized the IT industry by facilitating access to infrastructure and software services on a subscription basis. As a result, more companies with expertise in IT have decided to provide additional cloud services to their customers. The difficulty that consumers face when choosing a cloud computing service provider is enhanced by the multitude of suppliers in the market, and the lack of a framework that allows the evaluation of different providers based on the type of service offered and its quality (Quality of Service - QoS).

Both in academic and business environment there starts to emerge different conceptual frameworks aimed at regulating the quality of cloud data storage service (QoS) and service level agreement - (Service Level Agreement - SLA).

At present, after about four years since the start of intensive media coverage of the cloud computing technology, there are still many definitions for it. From the multitude of existing definitions for this concept we will chose only two: the official definition of the National Institute for Standards and Technology in the United States of America and the definition given by the Romanian Court of Accounts. According to the official definition of the National Institute of Standards and Technology USA (NIST), "Cloud computing is a model for enabling

ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction". The Romanian Court of Accounts defines the concept of cloud computing as "a style of computing in which the use of IT capabilities are provided as a service and allows users to access distributed services based on new technologies via the Internet without the knowledge, expertise or control technological infrastructure to support these services. "

Both of the above definitions refer to the following characteristics of the cloud computing technology:

- on-demand service;
- network access;
- Sharing of resources;
- Flexible service;
- Measured service.

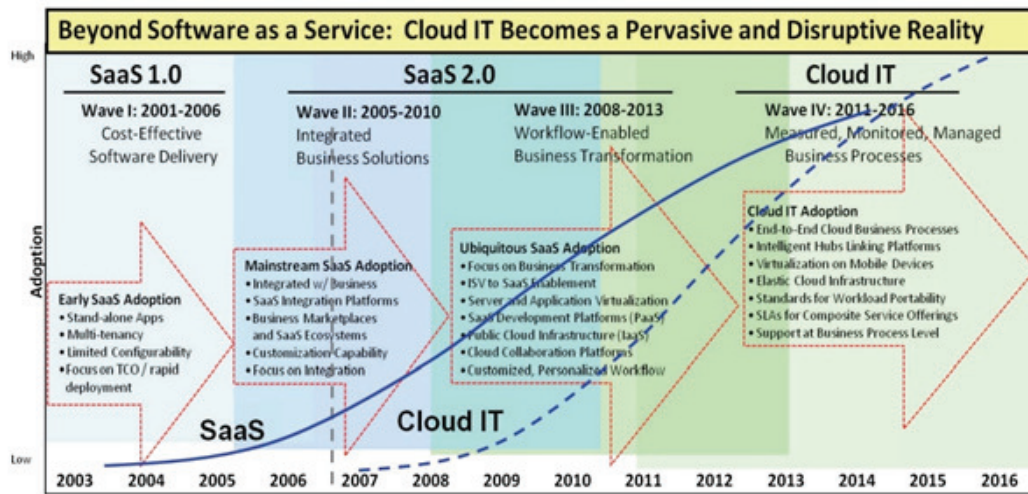
Perhaps the best known model of cloud computing service delivery is "Software as a Service" - SaaS). Also known as "software on demand" and is provided by independent software vendors (ISV) or an application providers (APS), which is actually a delivery model in which software applications and associated data are hosted in electronic platforms located in the cloud.

In Özkır's view (2012), Software-as-a-Service (or "cloud-based business solutions") is a means of acquiring and using software resources over the Internet, its users do not need to buy, install and maintain software. Thus, based on Özkır's idea (2012), the main advantages of using SaaS is, first, to reduce the initial investment in software and secondly, simplified software management.

Even at the present time there is a dispute among analysts whether SaaS will replace all traditional software solutions. Consumer reaction to technology migration to the cloud IT was generally good, witnessed by the spread of the increasing use of

this technology. In Özkır's view (2012), given that many users prefer the classic software distribution model and SaaS market share increases, the two software distribution models still complement each other.

Figure 1 Development of SaaS



Source: Andrew Karpie, Take-away: "Cloud Business Summit" NYC 5/11/11, 2011, <http://andrewkarpie.com/wordpress/?p=560>

As shown in the "Software-as-a-Service: Managing Key Concerns and Considerations" Saugatuck Technology report from 2010, the first period of development of SaaS (2003-2006) was marked by a lack of customization options for the applications which contributed to a low rate of adoption of this software distribution model. Since 2007, the rate of adoption of cloud computing technology began to increase significantly just because of the existence of different customization options (see Figure 1).

IDC a Romanian research company conducted a study in 2010 on the Romanian market of Cloud Computing ("Romania Cloud Services 2011-2015 Forecast and 2010

Competitive Analysis"), the review considered that the cloud market will grow Romania at least 5 times faster than overall IT market, the fastest growing will probably be Platform as a Service - PaaS and the lowest growing for SaaS.

The results of the "Cloud Adoption, IT Strategies from Business Perspectives" study conducted by CIO Council Romania based on a sample of 107 large companies showed that 61% of companies in Romania are using cloud computing-based services. In the opinion of experts, the remaining 39% of companies will be forced to choose and use at least one the cloud services in the near future to avoid losing competitive advantage.

## 2. User expectations of cloud services VS. Responsibility of the cloud providers

The increasingly ubiquitous nature of cloud computing technology is closely linked to the concept of "Service Level Agreement" (SLA).

Like the concept of cloud computing, the SLA has numerous definitions arising from the diversity of the proposed SLA by cloud providers. In fact, SLA is a contract that does not explain with a great level of detail the cloud services provided, but rather the ways in which these services are provided. For a less experienced user, this multitude of definitions creates a confusion between the definition of the cloud services purchase contract and the SLA.

According to the Information Technology Infrastructure Library, "an SLA is a formal document, negotiated which defines (or attempts to define), in terms of quantity (and sometimes quality) the customer service that is offered. All values included in the SLA should be measured regularly in the binding document and mention the person who made the measurements. "According to the Explanatory Dictionary of the Romanian Language, a contract is an "agreement

concluded between two or more persons (natural or legal) for the creation, modification or termination of rights and obligations between themselves. These two definitions are very similar for sure, however, one can identify the certain differences, such as:

- SLA is used only for creating or modifying rights and obligations of the parties, while a contract may be related to the termination or extinction of rights and obligations between two or more parties;
- It is necessary to have a contract before signing an SLA, the reverse is not true.

At this time, there isn't a standard model of SLA's or contracts for cloud computing services. The availability of such standardized documents would contribute significantly to reducing the confusion between the definitions of these two terms.

The responsibilities of cloud computing users and providers differ from those of traditional IT services, users and providers. Table 1 illustrates the separation of responsibilities of users and the providers of cloud services. Unlike traditional IT solutions, where the responsibility for their smooth functioning is due only to the owner of hardware and software resources, the responsibility for cloud computing IT solutions is shared between customers and suppliers.

Table 1. Sharing responsibilities between users and providers of cloud services

Cloud Computing elements	Classic IT solutions	Cloud Computing		
		IaaS	PaaS	SaaS
Applications	Resource owner	user	user	provider
Data	Resource owner	user	user	provider
Runtime	Resource owner	user	provider	provider
Middleware	Resource owner	user	provider	provider
Operating System	Resource owner	user	provider	provider
Virtualization	Resource owner	provider	provider	provider

<b>Servers</b>	Resource owner	provider	provider	provider
<b>Storage</b>	Resource owner	provider	provider	provider
<b>Network</b>	Resource owner	provider	provider	provider

Source: According to : Yung Chou, *Cloud Computing Primer for IT Pros*, 2010, <http://blogs.technet.com/bl/yungchou/archive/2010/11/15/cloud-computing-primer-for-it-pros.aspx>

Due to its capabilities, functionalities and architectural design, cloud computing started to spread out due the advantages in terms of data security, examples of this are centralized approach to data security, data segmentation and processes, controlled redundancy of backup processes and data availability, anywhere and anytime.

While multiple “traditional” disadvantages are tackled due to the unique characteristics of the cloud infrastructure, it requires risk assessment in areas such as data availability and reliability problems, data integrity, recovery and privacy.

Jaeger, Lin and Grimes (2008) believe that in order to start the analysis of the cloud security issues one must consider the user’s expectations. They identify the minimum expectations of users as:

- Reliability and responsibility: users expect the “cloud” to be a reliable resource, especially if the cloud provider takes over the task of running important applications and they will expect clear delimitation of responsibility in case of serious problems.
- Security, privacy and anonymity: users expect cloud providers to prevent unauthorized access to their data and code and that sensitive data will remain private. Users can also expect that the cloud provider, other third parties or authorities will not monitor their work. The only exception might be permitted to cloud providers who need to monitor the activity in order to control the quality of service provided.

- Access and use constraints: users expect to access and use the cloud when they want, without obstacles from the cloud provider or third parties, and they need assurance that their intellectual property rights are respected.

Thus, based on the data presented in Table 1 the following areas of responsibility related to customers may be identified for cloud service providers, mainly SaaS providers:

**1. Ensuring data protection:** Unlike the other two models of cloud service delivery (Platform as a Service - PaaS and Infrastructure as a Service - IaaS) where responsibility for security lies with the user, the SaaS provider bears the responsibility of ensuring the protection of data (Olteanu, 2010). Confidentiality, integrity and availability must be ensured for data, software and hardware resources (Armbrust, 2010).

One of the solutions for the implementation of cloud computing technology in business accounting is the cloud that enables dematerialization of accounting, migration of certain operations and account processing in the electronic platform in the cloud. Most providers of prepaid accounting services using the cloud computing technology ensure customer privacy during both the contract and after its completion. The data remains the property of the client, but access to it is subject to a fee to access the service.

**2. Complete and accurate information:** this should be enhanced by the SLA. Some SaaS providers in Romania in the field of accounting clearly present its obligations as providers, but do not mention the total costs of accessing the service in the service contract.

**3. Providing technical assistance:** Unlike most SaaS providers, on the Romanian cloud market there are some suppliers that do not include technical assistance service cost, this is considered an additional service.

**4. Complaint handling:** Ideally, all providers of cloud services, but especially SaaS providers should present the procedure for submitting and handling complaints. However, some players in this market do not refer to it in the public contracts for using the service.

**5. Education and awareness of users:** because the service being provided is new and ever changing, providers should ensure that most clients have the latest information in the field. Providers in the field of accounting, should not limit their knowledge to general cloud computing trade shows.

### **3. Study on the extent to which SaaS providers are responsible for services in the cloud**

As noted above, one of the solutions to the successful implementations of cloud computing technology in the economy is the "cloud accounting" technology derived from the "cloud computing" that allows storage of the company's financial and accounting documents in the cloud and permits performing accounting processing on electronic platforms on the Internet.

As cloud-based accounting solutions are serving consumers and users of financial

accounting information we chose to study the perception of students enrolled in the master programs organized by the Faculty of Accounting and Management Information Systems from the Bucharest University of Economic Studies, on the extent to which SaaS providers responsible for services provided. Most respondents working in the field of accounting and accounting applications use standalone, integrated or semi-integrated ERP systems.

We have chosen this study in field verification of user perception of accountability for the cloud on cloud services provided by suppliers, solutions for e-accounting, which in the near future are likely to turn into real solutions "cloud accounting". In Patel's view (2011), e-accounting can be defined as the process of inserting online and Internet technologies in accounting. In the last decades Internet Financial Reporting evolved from printed reports published online to powerful and flexible formats as XBRL which is growing around the world with increasing participation from individual countries and international organizations (Gorgan & Gorgan, 2010).

Following the electronic distribution during January 2013 - June 2013 of survey conducted by the research team resulted in 418 usable responses, the results of statistical processing are the following:

**A. Understanding the concept of "cloud computing":** only 10% of respondents said they are not familiar with this concept. Among them, more than 70% work in the service industry, the remaining 30% work in the IT or financial field. Among the respondents who said they were familiar with cloud computing, 90% work in the IT and financial sectors.

This distribution of responses is justified by the propagation of information affecting IT industry: naturally, those working in

IT need to update their IT skills and are often the first to learn of the existence of new trends in information technology. Then, the information is sent to those working in areas closely associated with the IT, such as the financial sector.

**B. The company you work for is using cloud services?** If so, what type of cloud services? 56% of respondents said that working in companies that use cloud services. Of them, 90% work in the IT sector and 50% work in finance. All of the respondents working in the services sector work in a company that uses cloud services. Respondents working in the financial field have indicated that the type of service used is a SaaS accounting and the respondents working in IT indicated that the company they work for either a SaaS model (80%) or an IaaS model (20%).

**C. Does the cloud provider ensure data protection?** : Of the 56% of respondents that said that the companies that employed them uses the cloud, 80% said that data protection is provided by the cloud provider, but that internal security measures to strengthen data security are applied. The other 20% said they do not know such details about data protection.

**D. Does the cloud provider provide accurate and complete information about the services offered?** : 68% of respondents working in companies using the cloud servants said they did not receive complete and accurate information about the services they receive, stating that it was necessary to sign additional agreements governing these omissions.

**E. Does the cloud provider provide technical assistance?** All respondents working in companies using the cloud said that technical assistance is provided by the supplier. Of these, only those who work in companies that use IaaS model stated that technical assistance is not charged extra.

F. What is the complaints handling procedure? None of the respondents working in companies that use cloud are aware of the complaints handling procedures.

G. Does the cloud provider inform the consumer of their rights and obligations of cloud services? All respondents working in companies using the cloud services stated that the rights and obligations of the consumers have been communicated to the customers and they are available anytime.

### Conclusions

More and more providers of cloud computing solutions, SaaS in particular have increasingly raised numerous questions concerning responsibility related to customers, especially given that there is no standard model agreement for this technology.

Our research work was aimed in identifying the perceptions of students enrolled in the master programs with the accounting profile of the Bucharest University of Economic Studies on the extent to which SaaS providers are responsible for the services provided. The study results showed that most respondents who are familiar with cloud computing work in the IT and financial fields use at least one the cloud services. The results revealed that the cloud providers ensure the protection of users, but do not provide complete and accurate information about their services.

In order to increase the number of customers and fidelize them as much as possible, we recommend at first, developing a standard contract for SaaS service delivery for each area served by the technology, secondly, to ensure a complete and accurate information in regards to the services provided and, thirdly, continuous customer education about the new changes in the industry and how they affect them.



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