ERP Evaluation in Cloud Computing Environment

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Abstract. With the evolution of the Internet many services before running on a local network, they moved to the cloud environment. As an example, the ERP Local migrating to the Cloud environment. This concept provides a new way of using IT resources. This research aims to evaluate the use of ERP in the Cloud Computing environment observing its advantages and disadvantages, as well as to identify its real applicability in the market, using as references the global survey by Gartner and an applied survey with IT experts on Internet services in Brazil. Based on these two studies it is possible to mitigate risks in the Local ERP migration to the ERP Cloud.

Keywords: ERP, Cloud Computing, System, Market.

1   Introduction

Upon the Internet arrival, changes began to happen more frequently and with a smaller time interval. Many companies seek new technological tools for decision-making processes with greater efficiency. Within the market alternatives, Cloud Computing emerges as a service available to organizations, in collaboration with organizational strategy.

Systems before located in the organizational environment, according to the company's strategy, can now be relocated to this new cloud service.

As an object of research, ERP is already established in organizations where it provides better process control, monitoring, informing, and enabling top management to have an increased visibility about the results.

Organizations usually keep information systems within their organizational environment, but with this new technology of Cloud Computing, one can envision a greater flexibility and at the same time be less dependent on the enterprise computational environment by decentralizing the workload capacity to the cloud.

Among the ERP objectives are included the integration of automation systems and their vital activities, such as manufacturing, human resources, finance and supply chain management [1]. The information generated from this process serves to support organizational decision-making processes.

The ERP solution is considered a business application, enabling the interconnection of data, processes and functional areas from an organization, providing a graphical interface so the user can manage such information [2].

The Enterprise Resource Planning (ERP) is seen as a strategic information and a tool to face competitors and to allow corporations to improve productivity [3]. Organizations implement ERP to gain visibility into business processes in a dynamic environment [2].

The expansion of the Internet and business led to a conceptual change in which the services performed on a desktop computer migrated to the internet providers [4].

The characteristics of cloud computing are: it is sold on demand; the service is managed by the provider; users can determine the amount of service to be taken; and users can log on to the network from any computer in the world [5].

A comprehensive definition is given by the National Institute of Standards and Technology, that states: "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" [5].

Cloud computing is a new way to provide information technology (IT) services for individuals and organizations. Its adoption is driven by availability, flexibility and agility [6].

Cloud computing offers a new computing paradigm that provides IT as a service. Service models (IaaS, PaaS, SaaS) provides a basis for understanding cloud computing and its capabilities [7].

IaaS - Infrastructure as a Service - the computing environment is provided as requested by the customer, as if it were rented, so the customer does not have to worry about maintenance costs or to upgrade the hardware used on the basis because the cloud environment is being used [7].

PaaS - Platform as a Service Cloud – the customers' capacity to move to cloud applications, designed and developed by themselves using certain programming language and tools provided by the supplier [7].

SaaS - Cloud Software as a Service - the consumers have the possibility to use an application that is not installed on their personal computer, just accessing the Internet [7].

Through this new scenario, there are questions between the use of local form ERP or in the Cloud.

2 Materials and Methods

2.1 Survey Procedure

Global companies conducted an exploratory research with reference to the research firm Gartner data in order to assess the world stage as the use and trends of Cloud Computing.

Gartner Research had a global character with 89 respondents. Respondents were distributed geographically: 33 were from North America, 36 from EMEA (Europe, the Middle East, and Africa), 13 from the APAC (Asia Pacific Region) and five from Latin American countries (two of them did not provide details of their location). There were companies in the service and manufacturing segments.

It is shown Ten Myths of Cloud Computing, data from Gartner [8]. Next, we highlight the local ERP characteristics confronting it with the Cloud environment.

It was also developed a survey applied to about sixteen IT specialists in Brazil aiming to identify the stage of Internet service providers in Brazil, with the following questions: 1- Do you consider that broadband providers meet the SLA (Service Level Agreement) standards? 2- Do you consider that broadband providers meet the connection speed expectations contracted? 3- What are the aspects to be observed for migrating from an ERP site to Cloud Computing?

To obtain feedback on the technical feasibility of a possible change to the Cloud ERP.

3 Results and Discussion

3.1 Research Summary

The worldwide market for ERP has a large competition in several segments, the companies market share that sell ERP shows a significant revenue: SAP 24% U$ 26.6 billion, Oracle 12% U$ 3.07 billion, Sage 6% U$ 2.1 billion, Infor 5.8% U$ 1.49 billion, Microsoft 5% U$ 1.28 billion, Other 41.2 [9].

What makes shows the ERP market as promising and expanding in the most several segments, stimulating employment new technologies.

There is a long way to go by migrating from Local ERP to Cloud ERP and there is a paradigm shift, because not all businesses have full compliance with this emerging concept. Gartner magazine published a report on the 10 Myths of Cloud Computing, and described shows below [8]:

1. Addresses that changing to the Cloud Computing (CC) technology is always related to money. Only 14% of companies choose to work with CC for cost reduction reasons.
2. You will have a Cloud Computing technology and everything will work well. The demands and the strategy for this decision-making should be analyzed.
3. The cloud should be used for everything. Not all the available service will indeed adherence.

4. The CEO decides the cloud strategy.
5. We need to understand if CC is a strategy or just a natural sale. The cloud strategy must be aligned with business objectives in order to meet multiple responses for investment.
6. The cloud is less secure than the local capacity of organizations. It depends on the suppliers to meet security standards.
7. Cloud is not for critical use mission. For certain segments it fits perfectly.
8. Cloud corresponds to Data Center. Which services should be taken to cloud.
9. Migrating to the cloud means automatically obtaining all features of the Cloud. Cloud computing has attributes and unique features, including scalability and elasticity, service based (and selfservice) Internet technologies are used, as it is shared (and uniform) and measured by use.
10. Virtualization = Private Cloud. Virtualization is commonly used enabling technology for cloud computing. However, it is not the only way to implement cloud computing.

Observing the 10 Myths of Cloud Computing presents the fundamental aspects such as relevance of the business, adhering to provide services in the Cloud, the organization's strategic alignment to use the new computing environment in order to contribute to the success of CC.

The benefits of cloud computing for users consists of: providing access to various applications without the need for installation on computers; applications can be accessed anywhere from any computer; avoiding the costs of hardware and software, using only what is necessary [5]. According to the Gartner research, cost is not always the relevant factor to opt for Cloud Computing.

The Gartner global survey reiterates the scenario about the decision-making to migrate to Cloud Computing [10]. In Fig. 1, a degree of uncertainty among opting for the new technology was identified, with about 30% of the participants choosing to keep the technology of the local ERP in their own organization, while 17% did not know, which shows lack of visibility planning and a timid tendency to make changes in a medium to long term period.
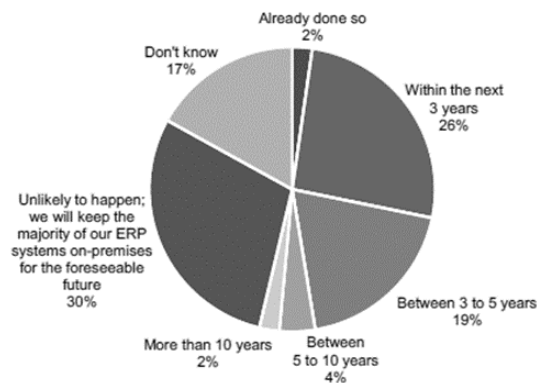
Fig. 1. Decision-making to migrate to Cloud Computing.

The most common disadvantages of cloud computing are related to the users identity and data security, because the shared environment generates a margin of doubt, another critical point that touches the supplier's security model and the loss of physical control of the environment [11].

As Gartner research, there is a percentage between 40 and 100% of failing the changes in manufacturing sector companies, because the use of ERP by departments such as MRP (Material Resource Planning) and PCP (Production Planning Control) require availability in information systems [10]. Although it is already being strongly used in the Communications and Services, Government and Education segments, the best insight for the next three years stands out in the Communication and Service segment.

The choice of not migrating to Cloud Computing in the manufacturing segment may be related to operations involved within the Organization because the ERP operation basically focuses on the following functions: Demand (Demand Forecast), Production (Planning and Control), Displacement (Data Transition, Shift Movement Material, Quality Control, Inventory) [12].

The Gartner research shows that for companies whose revenue is less than 10 million dollars, plans to implement it during the next 3 years varies around 70% while for companies with revenues exceeding 10 billion there is a more cautious attitude to move to cloud computing [10]. Thus, we can say that for small to medium-sized companies there is a need or strategy to change the paradigm in hardware investment and maintenance. This aspect can bring out that for large corporations, new technology goes through a maturation process but it do not let explicit the risk issue.

Observing the Cloud Computing scenario, it was developed a comparison to the Local ERP in order to establish the different characteristics of computer environments. The following differences are listed below:

1. There is a need to invest in infrastructure such as hardware, software, database and networks in the local environment.
2. Since ERP is in the organization's environment, adjustments can flow more naturally and quickly.
3. Several departments and stakeholders are involved; people have a degree of knowledge because either they have participated in its implantation or they have experienced system change.
4. It depends exclusively Organization's investments in security in the local.
5. On the Local ERP, being critical or not, the services work to meet the company's demands.

The topics cited above make clear the needs of each environment, providing an insight into the use of resources and their strategies. Thus, a survey was applied.

The success of ERP implementation depends on various types of integrations, such as processes, organization, data and applications [3]. Thus we can say that a synergy between people, processes and technology is necessary to achieve the critical success factor.

The ERP plays a vital role in the organization. Therefore changes such as corrections and improvements need to be planned and verified with greater certainty before entering the production environment, since the investment in hardware and software is highly critical [13].

The first question addressed in the survey applied is about the broadband access providers in Brazil that you use (or have used). Do you consider they meet the SLA (Service Level Agreement) standards? The responses obtained were as follows: Totally Agree 6.3%, Agree 6.3%, neither agree nor disagree 12.5% Disagree 62.5% Strongly Disagree 12.5%. Thus, it can be said: observing the availability criteria to keep the service in the air, if a company had total dependence on Internet providers and required some maintenance, it faced major disruptions.

This aspect is of paramount importance and shocking to opt for a location shift to ERP Cloud. The availability criterion in the IT field, should always be assessed and rated to not damage the provision of services with users.

Cloud Computing allows greater flexibility to the user through high-speed Internet, highlighting the use of the remote service and the low commitment of the use of hardware and software [14]. Based on this, the second question of the applied survey is whether the providers meet the connection speed expectations contracted from the broadband.

The scenario was as follows: 0% totally agree, 18.8% agree, 0% neither agree nor disagree, 68.8% disagree, 12.5% totally disagree. Based on this scenario, the internet speed question highlights that the level of dissatisfaction is latent based on the service offered, showing weaknesses regarding the necessary infrastructure.

The following scenario can be envisioned with Cloud Computing as opinions posed by experts:

- Before opting to migrate, it is required to mitigate the risks, identifying criteria to apply a methodology for decision-making. Alternatively, the Analytic Hierarchy Process (AHP) method allows better visibility.
- The business must grip on CC in the types of services that will be available; otherwise, it will be more feasible to keep the ERP at the new location.
- The hybrid solution (cloud services and some local services) initially shows the most cautious decision enabling to measure what should in fact be made available in the cloud.
- In case of a disaster in an organization, the data would be secure in a cloud environment.
- The security that was controlled by the organization's computing environment is decentralized to the IT providing company, with a need for trust in the services provided.

The hybrid cloud environment combine cloud services public and private allowing require extra capacity to a cloud public for temporary workload peaks [15]. The hybrid solution is cautious in decision making and what kind of services can be allocated in Local mode or in the Cloud.

Cloud Computing provides best results in the management of scalable hardware and software resources, optimizing the work, increasing the performance of implementation of computational tools [16].

Thus, alternative methods were presented in order to channel efforts as a suggestion for improving the selection and applicability of Cloud Computing environment.

4   Conclusions

The development of this research allowed to reveal that cloud computing is in a maturing stage, not everything that is currently being done in the local environment of an organization is exactly in accordance with the cloud environment. There is a conceptual change in the aspect of using the new technology. The real needs of an organization that leads to cloud computing should be identified in order to achieve an effective decision-making, assessing critically the adhesion of technology for business.

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