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Virtual Investigation of Grouping of on Premise and Cloud ERP

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***Abstract*-The objective of this study is to expand the knowledge of the existing studies related to cloud computing. Analysis of his study will be presented as a figure which will illustrate the ERP integration of the cloud and on-premise. This Research will give an idea to the new customers of ERP systems on how to deal with two-tier ERP systems (cloud and on-premises) as well as to enhance understanding of ERP services that can be carried on their premises and what ERP services can be outsourced over the cloud. Cloud ERP is quite a new, unclear and broad concept, given that all the studies related to it are current. More or less all cloud ERP providers describe their products as straight forward tasks. However it still remains unclear how companies can outsource ERP services over the cloud. Our research will focus on such ERP services that can be outsourced over the cloud, in addition to the risks coupled with any data or information that will be moved from in-house into the cloud**

Keyword- ERP, Cloud Computing, Web Mining, Rapid Miner

1 Introduction

The purpose of our work is to clarify several ambiguities which surround the cloud ERP and the on-premises ERP systems. Foremost idea is to shed light on trade-off between cloud ERP and ERP in the companies' premises based on cloud outsourcing services, focusing on small and midsized manufacturing companies. Various Enterprise Resource Planning (ERP) providers have proved that ERP has improved the quality and efficiency of numerous companies´ businesses. ERP systems also provide a real time support to managerial decision making. Mainly all of the ERP systems combine all departments and business functions of the entire company into a single shared system. An ERP system helps companies to manage and integrate business activities such as planning, inventory, purchasing, sales, finance, marketing, human resources, etc. ERP enhances company´s agility and flexibility allowing different parts of the company to communicate with others, sharing information and becoming more interconnected. The ERP system is usually installed in the companies´ computer network infrastructure. Nowadays, cloud technology has shifted the management of hardware and software to the cloud services provider. Mostly all of business applications are and will be moving into cloud-based computing, due to the ubiquitous of internet devices that range from smart phones to all type of other internet devices.

Deloitte Consulting LLP [1], survey response of outsourcing and in sourcing from over 23 different countries and 22 primary industries from around the globe announced that:

"…outsourcing continues to go main stream as another standard business practice that should be evaluated as business needs mandate. Information Technology, Finance, and Human Resources continue to lead the business processes in outsourcing".

The results showed (Figure 1) that 47% of the companies do not use cloud computing services, 23% do not know if they are using cloud services and only 30% are aware of cloud services and are using it. If we add 23% of companies who do not know that they are using cloud service and 47% of companies who do not use cloud computing services we get 60% of companies that are not basically using cloud computing. This will necessitate launching many studies and research in this field. But this paper will focus only on ERP services that can be outsourced over the cloud.

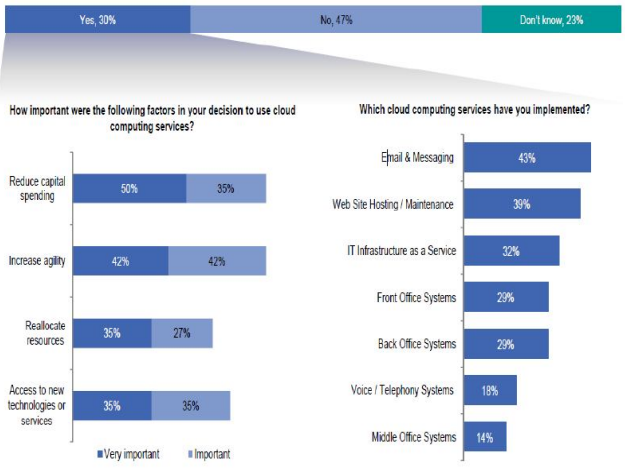

Figure 1. Important factors that drive cloud computing services compared to the already implemented cloud computing services. Source [1]

2 Benefits of cloud ERP service outsourcing
It starts by presenting cloud computing services as another form of outsourcing.

2.1 Alleviating risks
According to Clemons and Yuanyuan [2], cloud computing services can be viewed as a form of outsourcing; they added that the bright side of outsourcing is that essential risks of all outsourcing contracts are shared among the contractors. Similarly, cloud ERP services fall in cloud computing category. ERP customers and the contractors have a mutual benefit as partners that complete each other over the cloud. Both partners will build a trustful relationship based on win-win concept.

2.2 Service cost saving
According to Velte et al [3] using cloud services will cut cost by eliminating upfront expenses for hardware and software. The maintenance, up grading of ERP and hardware associated with it over the cloud is processed in the provider´s premises. As it was mentioned in section 1.3, the main benefit of cloud outsourcing is using ERP system at low costs and flexibility of doing business over the cloud. Ellis [4] shares same idea about cost saving with Mattison and Raj[5, the only cost associated with ERP system is the predictable fixed monthly fee for the utility. According to cloud ERP providers such as SAP [6], Oracle and Microsoft Dynamic, the availability of ERP as SaaS is 24/7; the customers will not face any shut down of services. Mattison and Raj [5] have compared the on-premises ERP and cloud ERP four years cost saving based on the concept of total cost of ownership from the research

2.3 Easy access
Mobile cloud computing represents an opportunity to deploy ERP over the cloud due to ever increasing cell phone and Smartphone use, ERP cloud providers are talking about cloud mobility services [6]. The ubiquitous of internet devices such as smart phones, Ipads, internet tables and portable computers will encourage customers to use the cloud ERP. It helps their employees to get access to ERP system and work from anywhere at any time even in the blue sky.

2.4 Dashboard
Several ERP providers include dashboard as added value that allows managers to promptly comprehend their businesses performances based on suitable key metrics. The dashboard is usually intended to be used by the top management who do not necessary have strong IT literature, by transforming complex company data into interactive dashboards. Therefore through cloud ERP managers can monitor employees and other business performances across the organization with key performance indicators (KPIs).

2.5 Focus on core business
Nearly all of companies, especially, midsize or small manufacturing companies do not afford to have own IT expert in the house due to the high costs associated with it. Typically, these companies operate in businesses that are not related to IT. They use IT only to run their business smoothly and enhance their competitive advantage in their market. Therefore, they prefer to focus on their core business by outsourcing IT activities.

2.6 Implementation
The ERP implementation over the cloud will be performed by the cloud ERP provider or cloud ERP partners. The traditional ERP implementation takes long time to be ready and to be used by the company´s employees. So, an ERP system on-premise is costly also to large companies, but in this paper the focus will be paid only to small and midsized manufacturing companies. However, the cloud ERP implementation takes less time than an ERP on-premise. Consequently, the customers of cloud ERP will save great time and resources reserved to troubleshooting and implementation of ERP.

2.7 Data safety
Here safety means that the customer makes sure his or her data is safe in the cloud in case of unexpected disaster, lack of electricity power, earthquake, floods, hurricane etc.

3. Literature Review:
Peter Schenkel, et.al.[7], Service provision of bricks-and-mortar services (e.g. cleaning, gardening) poses several challenges to the consumer. Locating a service provider as well as ordering and coordinating the service provision, requires intensive interaction between consumer and service provider. Owing to the regional anchoring of these services to a large extent services are provided by small- and medium-sized enterprises (SMEs). This poses additional challenges to the consumer: the market is fragmented and processes differ across service providers and industries. For services a similar consumer support is missing. In this paper we address the gap from a consumer's perspective by proposing a software architecture that integrates standard applications and modules to support the consumer process.

Dario Bruneo, **et.al. [8],** Cloud computing is the latest computing paradigm that delivers hardware and software resources as virtualized services. The main problem in mapping software applications to cloud services is selecting the best and most compatible software components to ensure a cost-effective model. Thus this technique for locating components to be migrated without actually moving them is needed. The author propose an approach which can be used in the decision-making process based on a set of measurable factors in the pricing models of cloud providers. The author in this approach suggests, coupling among different components of the system is measured. After that a proposed cost measuring function is used to choose the optimal migration

scenarios. The Experimental results show the applicability, easy adaptability and efficiency of the suggested approach.

Mahesh Srinivasan and Asoke Dey [9], Recent developments have created an opportunity for organizations to leverage Web-based technologies. Researchers suggest that organizational initiatives need to be supported by sound existing infrastructures based on well-functioning Enterprise Resource Planning (ERP) systems. Also, business processes in multiple organizations across the supply chain need to be integrated to forge tighter links, from raw materials to customers. In this work the authors examines the evolving relationship between ERP and e-Business. The research shows how organizations can gain competitive advantage by leveraging the complementarities between these two technologies. We present a framework of e-Supply Chain Management (e-SCM) which facilitates the integration of business processes across the supply chain. We also discuss the recent developments in the area of cloud computing and its impact on the Internet-enabled supply chain environment.

Nicolas Nussbaumer and Xiaodong Liu, Cloud computing has gained immense momentum during recent years and has ultimately become a viable solutions for large and small firms. The author proposes a novel framework that helps SMEs to master migration related impediments. Researcher carried out several steps for this. Firstly, the work takes into account SME specific requirements and articulates their importance during the cloud provider selection phase. The results demonstrate that factors such as security, reliability, cost, performance as well as flexibility and service and support have a pivotal role to play and require close attention. Secondly, decisive attributes were defined that qualify business components and services as cloud-fit. Finally, the framework itself was proposed, which focuses on a systematic service-oriented approach and helps companies to analyse their existing business processes in the course of cloud migration. The framework was verified in its practicability using a concrete scenario and a subsequent prototypical cloud implementation.

3.Methodology

Small and midsized manufacturing companies are recommended to outsource several ERP business processes and planning over the cloud. The discovered hidden patterns show that companies are aware of the importance of the planning phase when adapting cloud ERP. Companies acknowledged that outsourcing services using cloud ERP to the third party will consume a considerable time. To save time, manufacturing companies are highly recommended to use a consultants firm to find not only the right partner but the right cloud ERP system and all other possible service partners as well. The result analysis shows that consultants are the first who look for the new technologies to speed business processing and find new solutions. That is why small and midsized manufacturing companies are recommended to outsource cloud ERP system implementation to well known consultant firm. Small and midsized manufacturing companies ought to cooperate with consultants who are expert in cloud business and will find the cheapest and the most reliable software service provider.The overall picture of the operators used after uploading text tiles in RapidMiner is shown in figure 2:

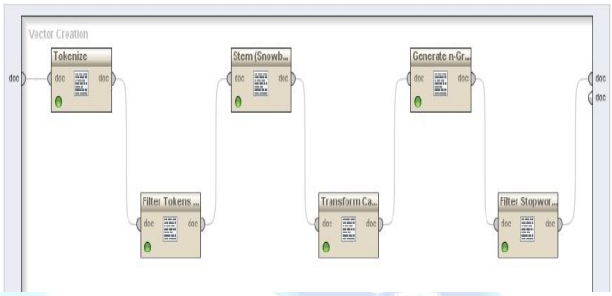

Figure 2. RapidMiner used text mining operators.

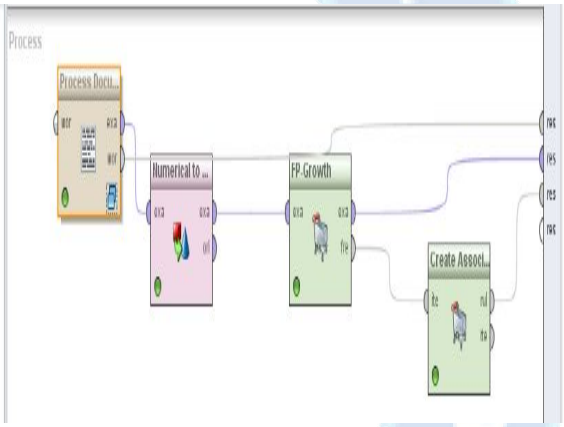

Figure 3. Transformation and processing of data in Rapid Miner

4 Findings and discussions

This section contains findings and discussions based on the result analysis of RapidMiner .The results are the frequent key words of hidden patterns extracted from the figures . The key words are used to build patterns in order to find possible services that can be outsourced over the cloud. It will help to answer the main question of this research work by suggesting first the services that can be outsourced over the cloud using cloud ERP.

4.1 Companies

For cloud ERP in manufacturing field, , the finding key words related to ERP services with 95, 7% confidence level are: time, provider, industries, product, improvement, solution, plan, management, business, companies and process. From these terms we can build hidden service patterns in order to reveal new knowledge about the companies´ behavior related to cloud ERP. In the companies' categories, we find out that companies are seeking to speed up their business process

(improving business process time) by outsourcing some cloud ERP activities over the cloud to the third party. But outsourcing to the third party will take time to find the right partner. To save time, manufacturing companies are highly recommended to use a consultants firm to find not only the right partner but the right cloud ERP system and all other possible service partners as well.

4.2 Consultants

We will look at consultants as bridge between companies and cloud ERP providers. We see the terms that are related ERP services: management, system, technology, customer, software, business, cost, provider, services and companies at 92, 6 % confidence level The revealed patterns: software for customer service, technology management and software service provider suggest outsourcing cloud ERP services related to ERP provider. Several cloud ERP providers do not offer cloud storage where the actual cloud ERP resides. This service is the most crucial part of cloud ERP outsourcing. The manufacturing companies have to know where their Cloud ERP and their data is stored due to the security issues. Here the role of consultants comes to be vital. Consultants will help companies to make sure that the location of data center is absolutely in country where the legislation gives the full right only to the data owner.

4.3 Cloud ERP providers

The terms that are related ERP services: service, system, solution, customer, information, companies, data, product, provider, management, time, application, including, base, process, change, support and requirement at 100% of confidence level. From these terms we can build services patterns to reveal new knowledge about the ERP provider behavior related to cloud ERP.
The revealed hidden patterns: “data processing, data service management, data solution requirement, customer requirement solutions and application service provider” illustrate that ERP providers are aware of their customer data issues; they often have their own partners that can handle cloud ERP storages safety. ERP provider provides hosting, updates and backups of the ERP over the cloud including security service. Consequently, the security can be outsourced to ERP providers as well as hosting of the ERP over the cloud. From other discovered patterns under cloud ERP providers these service can be outsourced over the cloud to cloud provider or third reliable party:

1) “Data service management” which can contain data solution requirement: The provider will ensure the data safety, control, availability, server maintenance, accessibility 24/7 and makes sure that data is owned by the customer of cloud ERP only. The data has to be masked or encrypted, no leak of data outside of the cloud storage even if it is masked or encrypted.

2) “System support requirement”: This can be updating, customizing of the cloud ERP system over the cloud. This service is already included in the cloud ERP.

3) “Managing change and solution”: offer innovative solutions that can keep companies competitive regardless of the market changes, the provider of cloud ERP may improve the speed and efficiency of the ERP system or find third party to provide added application on top of the cloud ERP in order to answer the customers’ business specific requirement.

4) “Product service solution based on customer´s or companies´ data”: Most of cloud ERP providers have a history data of their customers, this data can be different solutions offered to different customers. So this data can be used to offer other services that are related to the companies´ products such as logistics services that can be outsourced to third party using same cloud ERP. I learned that cloud ERP providers can offer same ERP system to several small and midsized companies each company has own authentication credentials, explained that companies using same ERP system in the cloud will not notice any difference, everything happens in the cloud each company will have own ERP system in the cloud. The benefits of it are that such system is easy to implement and use it within 24 hours.

5) “Applications support requirement or customer requirement solutions”: These applications can be dashboards that enable production managers to gain a hand on customer information management. Applications can help managers to trace raw material goods and products movement towards retailers in real time.

6) “Information system management”: Enable companies to use cloud ERP to manage their business departments efficiently and effectively. It will help companies to manage their data in order to facilitate their businesses strategies and their operational processes activities. Managing information is proven to be essential in fast changing business environment. This will help all managers, in particular top management to make knowledgeable decision in right time. For these reason many third party companies offer a smart application on top of cloud ERP dedicated to top management.
These services can be outsourced to a suitable third part. But overall, manufacturing companies are highly recommended to use consultancy services whenever they decide to outsource any services over cloud ERP. All the ERP outsourced services over the cloud are presented in the conclusion section 8.1 as part of summarization of this research.

5 Conclusion

The objective of this paper is to expand the knowledge of the existing studies related to cloud computing. Analysis of his study will be presented as a figure which will illustrate the ERP integration of the cloud and on-premise. This Research will give an idea to the new customers of ERP systems on how

to deal with two-tier ERP systems (cloud and on-premises) as well as to enhance understanding of ERP services that can be carried on their premises and what ERP services can be outsourced over the cloud. Cloud ERP is quite a new, unclear and broad concept, given that all the studies related to it are current. More or less all cloud ERP providers describe their products as straight forward tasks. However it still remains unclear how companies can outsource ERP services over the cloud. Our research focus on such ERP services that can be outsourced over the cloud, in addition to the risks coupled with any data or information that will be moved from in-house into the cloud. Cloud ERP and on-premise ERP basically have similar modules and functions. The cloud is predicted to grow in the upcoming years. The fear and the economic recession have halted the speed of cloud deployment. It will be interesting to perform researches in case of ERP providers that will offer only cloud ERP systems. The research therefore should focus on manufacturing companies or other industries behaviors and their reactions. New alliances will be formed, especially in field of security field and ERP systems in order to overcome the burden of ERP systems integrations and security issues. The service outsourcing will be reshaped; the laws related to cloud outsourcing will be developed as well. The research can be carried out with people from different study backgrounds. Researchers can be law students, technical engineering students and business oriented students

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