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A Study on BPaaS with TCO Model

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***Abstract*:** The need for increasing and performance the agility of a business process, along with different cost control measures is currently playing an important role in the future of Business Process as a Service into the Market of Cloud Computing Services. The operational scarcities of capital and high cost pressures force the industry to seek out innovative engagement standards to accomplish plans and goals. In this paper, based on the formal Total Cost of Ownership model for Cloud Computing Services from previous study, we provide literature review, analyze, develop a mathematical approach of Total Cost of Ownership and evaluate a case study of Business Process as a Service. The implementation of this perspective could eliminate the necessitate of capital investments while reducing operational expenses, and rating differently to generate outstanding results for Cloud Service Providers and benefits for the cloud users.

Keywords: Cloud Computing Services, Industrial Internet, Business Process as a Service, Total Cost of Ownership, Costs, Pricing, Mathematical Model, Case Study

I. INTRODUCTION

A. Primary Purpose

Cloud Computing Services appears to suggest considerable cost advantages. In general, all sectors could benefit from this innumerable list of benefits, it happens that commonly companies do not manage an internal IT infrastructure plan and rigorous methodologies of pricing or support inducted methods [1]. We procure to answer if the costs correlated with Cloud Computing Services are really near to the ground? Our mainly found shows that cost types and external factors are frequently the main reason to underrate by practitioners. This paper presents a Business Process as a Service and Total Cost of Ownership approach for Cloud Computing Services. By applying a study case model for Cloud Computing Services from previous study, we provide literature review, analyze, develop a mathematical approach of Total Cost of Ownership and evaluate a case study of Business Process as a Service; the approach is limited for a development and evaluation of the formal mathematical model. Our model properly fits the practical requirements and supports decision making in Cloud Computing. We recommend a new pattern of Business Computing, and dynamically Computing Services as state-of-the-art technologies. Cloud Computing already started to impact deeply on Business Process Management (BPM) which is known with the entitled of Business Process as a Service, henceforth (BPaaS). To understand BPaaS, we cite that it simply brings a new market and or to upgrade the existing system or process without much infrastructure cost for its applicability in the enterprises.

This document is divided as follows,

Section one represents the literature review to introduce a general and descriptive approach that is compelling to the adoption of Cloud Computing in the ultimately legend of businesses, define the term Cloud Computing, Total Cost of Ownership (TCO) and Business Process as a Service (BPaaS), the administrative adoptions and peculiar innovations accompanied by ideas from Cloud Service Providers for the only purpose of facilitate and guarantee quality of service and decision making to the Customer Users.

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Section two resumes the related work, Industrial Internet, Cloud Computing Services as an engine of innovation, and previous related work to underlying our research approach.

Section three comprises the discussion of our model and its assumptions to depict some of the formulation research, technical approach in our proposal case study where the applied cost composition and the scrutiny of pricing schemes of genuine Cloud Computing Services.

Section four brings together the assignment of cost factors and in a Total Cost of Ownership model.

Section five exemplifies our mathematical approach of Total Cost of Ownership and introduces how to evaluate our case study of BPaaS with Total Cost of Ownership model; this mathematical conjecture is to show a practical example to point out feasible values for the variables.

Section six offers a technical evaluation based in our found from the case study to state how BPaaS could eliminate the necessitate of capital investments while reducing operational expenses and rating differently to generate outstanding results for Cloud Service Providers and benefits for the Cloud Users, series of formulas are deployed.

Finally in the last section, we draw the conclusions, commitment limitations and our found of applying BPaaS model to leverage benefits in any industry as an integrator of Cloud Computing Service Architecture in future research.

B. Outline Definition of Cloud Computing Services, Total Cost of Ownership and Business Process as a Service

Cloud Computing across a wide variety of explanations is intended to allow the client to avail of different services without examination in the underlying architecture. A cloud can present quite a few types of services, from word processing storage, right along to web hosting. In fact, a computing cloud can combine services to present the user with a homogenous optimized result. The National Institute of Standards and Technology (NIST) is well-liked, since it provides a comprehensive synopsis: “Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service-provider interaction.” [2].

Our output on this definition contributes to explain three service models in Cloud Computing: Infrastructure as a Service (IaaS), which is belong to IT services as e. g. computing power and storage capacity; Platform as a Service (PaaS) to make available developer platforms and Software as a Service (SaaS), including software services that are way in through an internet browser.

To cooperate with the cost involved in this three service models, we cannot ignore the greater part of possible costs and cost categories of Cloud Computing Services, in that sense companies are forward and backward to apply a Total Cost of Ownership (TCO) approach. Total cost of ownership (TCO) [3] is a type of calculation designed to help consumers and enterprise managers assessing direct and indirect costs as well as benefits related to the purchase of computer software or hardware.

The fourth layer of cloud computing services model is Business process as a service (BPaaS). BPaaS focuses on the cloud delivery of on demand business processes and is the distribution of highly standardized end-to-end business processes [4]. BPaaS is an emerging layer where process assembly is offered as a service to allow the consumer to orchestrate services from disparate sources and a specialization of SaaS [5].

II. RELATED WORK

To write this paper on a concrete foundation, we concern of a conceptual literature review. We have come across the review possibility and concentrate on TCO and BPaaS in order to determine the key words for the research and approach the sphere of Cloud Computing which include terms like “Cost”, Pricing combined

with “Cloud Computing” and “Business Process as a Service”. Next, we utilized these key words to databases to receive scientific, peer-reviewed papers. However, we do not provide further information on how to develop a software tool to calculate the cost. To the best of our effort, we are working in the development of a comprehensive BPaaS and TCO model perspective.

A. Industrial Internet

The Industrial Internet refers to the integration of complex physical machinery with networked sensors and software. It draws together fields such as Machine Learning, Big Data, Internet of Things, and Machine-to-Machine communication to gather data from physical objects, analyze it (often in real-time), and use it to control and adjust operations. To date, digital technology has largely enabled efficiencies within the enterprise and revolutionized Business to Consumers (B2C) companies.

In the long future, the digital business will be characterized as a Perceptive Enterprise where: (1) Machines are an active part of the business process and (2) The product is less important than the information that it carries [11]. These technologies include: pervasive networks; open-source microcontrollers; software that can analyze massive amounts of data, understand human preferences, and optimize across many variables; and the computing power needed to run this intelligence, available anywhere at little cost [12].

The Industrial Internet of Things (IIoT) is marrying this physical world as sensors, devices and machines with Internet and minds by utilizing deep analytics through software and is trending big data to strengthen new insight, new business and brilliant [19]. According to Jeff Immelt, GE chairman and CEO, at the GE Minds and Machines 2013 conference in Chicago, the business and technology leaders can implement solutions to improve efficiency and ultimately create smarter, faster, and more predictive solutions to improve mass production, efficiency, and reliability [13]. The era of cloud is the next step to enable new functionality for industries and our lives at lower cost, making economic sense to customers, workforce productivity and better decision-making.

B. Cloud Computing Services

Cloud computing can be seen as a services’ collection [14] and is “A large-scale distributed computing paradigm that is driven by economies of scales, in which a pool of abstracted, virtualized, dynamically-scalable, managed computing power, storage, platforms, and services are delivered on demand to external customers over the Internet”. The cloud computing paradigm differs dramatically from today’s IT model because it decouples data and software from the servers and storage systems running them and enables IT resources to be dynamically allocated and delivered as a service, either in component parts [15].

McKinsey (2009) pointed that cloud computing as “hardware-based services offering compute, network and storage capacity where: 1) hardware management is highly abstracted from the buyer; 2) buyers incur infrastructure costs as variable OPEX; 3) Infrastructure is highly elastic (up or down)”. They also strongly focuses on cost effective for SMEs, forecasted currently is attractive to large enterprises and the important point is large companies could achieve server utilization rates similar to cloud providers are achieving from their platforms and by adopting data center best practices, could drive down server TCO by more than 50% [20].

Linder *et al.* (2010) argued that “The cloud computing service model combines a general organizing principle for IT delivery, infrastructure components, an architectural approach and an economic model” [16]. According to Gartner (2008), a leading market researcher in cloud computing stated that it is “a style of computing where scalable and elastic IT-related capabilities are provided as a service to external customers using Internet technologies” [21]. Cloud service provider would host cloud services for cloud service consumers; it depends on the cloud service model and which type of services that customers offer and cloud service developer could build to the end user [22].

Nowadays, the cloud computing services model is described with four layers as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) and Business Process as a Service (BPaaS) [17].

C. BPaaS and Total Cost of Ownership - Cost Benefit Analysis

"BPaaS creates new opportunities for organizations to exploit the cloud, as the abstraction away from technical and integration issues gives organization a new way to conduct their business." [7]. BPaaS is a top-level part of the service-level architecture (BPaaS -> SaaS -> PaaS -> IaaS) for cloud platform (fees for CPU hour, time contingent, storage, internet service provider costs and inbound and outbound data transfer costs). This refers to any business process such as payroll, multivendor e-commerce, advertising, printing, enterprise-wide applications and common business processes and could include contract negotiation services.

BPaaS services can also be designed to automate certain business utility services such as billing and shipping. BPaaS can be a part internal cloud services as well as external services from different cloud vendor types such as public, hybrid and virtual private. In overall some other literature review Strebel and Stage [8] and Kondo et al. [9], they conclude finding that in the long run computing services are inexpensively more beneficial but requires high start-up investments.

For short and high performance tasks, it is recommendable to apply a commercial Cloud Computing Service. The BPaaS most important aspect of the service is to integrate scattered and embedded business rules together in many organizations. Often business rules are scattered and some embedded in different places within the organizations. Therefore, organizations have difficulties in dealing with constant change and evolution of new businesses [10].

Gartner (2012) predicted that BPaaS is the largest segment primarily and will grow from $84.1 billion in 2012 to $144.7 billion in 2016 with eight sub segments are tracked: cloud payments (17.8%), cloud advertising (17.1%), and industry operations (15.1%); generated a global CAGR (Compound Annual Growth Rate) of 15% [23]. According to Everest Group (2012), "BPaaS is the new avatar of SaaS where buyers receive standardized business process services by accessing a shared set of resources at each delivery level (people, application, infrastructure) from a single services provider" and can build a TCO analysis based on a holistic framework that includes all three layers (infrastructure, application and operations) of BPaaS service delivery. BPaaS is the hidden chance for SMBs who can reduce TCO (includes all costs related to finance and account service delivery, technology application, and underlying infrastructure) by 30-40% compared with traditional model and by 40-55% when compared to an in-house model [24].

III. TECHNICAL APPROACH

A. Cycle Development

The author provides a general scope on this BPaaS and TCO approach and further go through several cycles of development. The process of research design is as follow:

- Step 1 - Identify the problem and discovery: Literature review of TCO with BPaaS
- Step 2 - Explore TCO model: Research TCO model based on previous study and BPaaS analysis
- Step 3 - TCO approach contribution: Mathematical model development
- Step 4 - Evaluation: Case study of BPaaS and conceptual perspective
- Step 5 - Conclusion: Implications, limitations and future research

This analysis is supported on a mixture of deductive and inductive fundamentals draws on our expertise and preliminary considerations, however, the results of this BPaaS and TCO model are continuously

in an undergoing review and the final iterative improvements will be accomplished in supplementary researches.

B. Assumptions and Applied Cost Structure

After conducting a comparison analysis of Cost Structure, Table I. shows the results of Cloud Computing Services that can be charged by some major BPaaS that already have an extensively existence and outstanding background of selling cloud services in the market. In essence, we have determined three main different pricing schemes which are distinguishable based on: pay-as-you-go (freedom to users to may use of service they want), monthly payments (which may be considered as a fully packages service and yearly usage (more belong to providers pricing).

Moreover, this scheme also can be classified in some other based pricing model, the fixes price depends on the type of sector, service or activities, it should be emphasized also that access to the cloud is a variable subject different providers who assign or price based on policy requirements. The table first, classifies a list of Providers and details the BPaaS Services that influence the cost types; consecutively we present the general policies of pricing to the users that are applied for each BPaaS Service type. Different companies are also listed in order to depict a chronological comparison of representations to transform these results into a mathematical model.

Table I
BPaaS Pricing Scheme

Provider	*BPaaS Services*
Genpact	Charge by monthly or yearlyServices: Finance and Accounting (FA), Human Resources (HR)
Salesforce	Monthly charge per user by group, professional, enterprise and performanceServices: Customer Relationship Management (CRM)
Zoho Creator	Monthly charge per use by standard, professional and enterpriseServices: FA, HR, CRM
Tech Mahindra	Monthly charge per user, Yearly charge per organizationServices: Procurement BPaaS (Contract Management, Invoice Management, ect.), FA, ERP, HR, CRM
eBuilder	Montly or Yearly charge per userServices: Supply Chain Management (eBuilder Order Fullfill, eBuilder After Sales, eBuilder After Sales Service Portal), Procurement, Financial Transactions, expense business process
Wipro	Monthly or Yearly charge per userServices: Payroll processing, Recruitment, FAO/payables and collections, Freight audit
Fujitsu Limited	Yearly charge per user with team package and enterprise packageServices: Business workflow and integration (Fujisu RunMyProcess)
IBM	Will be charge after registration, monthly or yearlyServices: Procurement, HR, Sales and Commerce, FA (eg. Payroll, printing and expense reporting)
Oracle	Yearly chargeServices: ERP, JD Edwards Application Version Enterprise One 9.1 (Finance: Genernal Ledger, Accounts Payable, Accounts receivable, Fixed Assests; Distribution: Inventory, Sales, Purchase, Pricing; Manufacturing: Shop-floor, Planning; Localization: Indian Taxations)

An insight can be obtained from Table I. where a semantic structure cost factors and assumption of particular pricing of Cloud Computing Service can be delivered through a Private Cloud if the customer or user and the cloud provider of the service is relatively attached to the same organization or dependable from a third party provider exclusively [18]. As we stated early, the third-party provider correspond to the Public Cloud which mean a variety of IaaS and therefore the user acquires the resources from an IaaS service cloud provider. However, some essential elements (characteristics) of Cloud Computing are explained, it is important to mention due that the providers in this scheme of third parties do not manage Public Data of Cloud; they are exclusively categorized in the Private Data contexture. Finally, the cost associated with

the Hybrid Clouds are not only unique belong with the monetary expenses of aggregating individual services rather than do so, providers are force to include solutions to enable Hybrid Clouds the service through the software platforms. We discover that Applications running in the cloud rely on different communication services, the distributed nature of cloud resources and methods used in internal clouds or different application modules.

IV. THE ASSIGNMENT OF COST FACTORS IN A TCO MODEL

The focus of our analysis lies in the cost comparison of different Cloud Computing Services and service models. To accomplish such analysis some basic requirements are needed to build the model. Table II. shows some factors identified and connected directly with cost types. In the next section, we proceed with the formula drawing to classify each cost factor and corresponding values. The formulas contain series of abbreviations referred to the cost factors applied in the suggested model. Some assumptions are deployed as we assume that Cost of Ownership and Cloud Computing Services are intrinsically related. The next tables are generically focus in each formula, steps, characteristics, cost unit prices and any other factor such time, periods, subdivisions and period index respectively. A completely detail is measure and predetermined based in consumed requirements.

Table II
BPaaS Cost Factors

Cost types	*Cost factors*	*Description*
Service charge of BPaaS (charBPaaS)	Acceess to the service system (acc)	Service charge when users access the service application
	User (u)	Number of users (individual, organization, group, team, enterprises)
	Onshore shared service (onss)	Local outsourcing service provider; it could be same country operations as head companies; operations' cost would be similar to current expenses
	Near-shore shared service (nss)	Nearby location outsourcing service provider, usually within similar time zones; cost advantage over local service, cultural benefits and language advantages.
	Offshore shared service (ofss)	Overseas outsourcing service provider; advantage in cost savings, manpower, technology and overall operations.
	Business process redesign service (bprs)	Re-engineering of existing business processes based on cloud computing services

V. BPAAS WITH TOTAL COST OF OWNERSHIP MODEL

A. Abbreviations and Acronyms

We have named and describe some formulas to integrate the Total Cost of Ownership, Amount of cost type based on the previous study of M.Walterbusch *et al.* (2013) [25]. This approach is highlighted as one of the most important cost-oriented. Mainly the abbreviations of the cost factors are also applied to develop the mathematical model. In order to transform such formulas into a mathematical representation we define in the Table III the characteristics of each meaning and structural application. We assume that TCO_{CCS} is considered the Total Cost of Ownership for Cloud Computing Services and equals to the sum total of all cost types while the $C_t = \Sigma C_t^f$ with $t \in T$, $f \in F$ is the referred Total amount of a cost; for instance the $C_f^t = \sum_i^n C_{f,i}^t$ is total amount of a cost type and influence on a cost factor with $i = \{1,\ldots,n\}$, $t \in T$, $f \in F$. Considering the complete period of time during cloud computing services has been used or is going to be

used and the period is subdivided into several periods "i". Each period comprises one month since this time period is predetermined by provider. And the entire time period consist of "*n*" periods. Similar situation occurs with $C^t_{f,i} = a^t_{f,i} * p^t_{f,i}$ where it is consider the variable $a^t_{f,i}$ that represents the variable for consumed or required quantity in period "i" and $p^t_{f,i}$ that characterizes unit costs or prices.

Table III
General Formulas of TCO Model

No.	*Name of formula*	*Description*	*Formulas*
G1	Total cost of ownership	Total cost of ownership for cloud computing services equals the sum total of all cost types	$TCO_{CCS} = \Sigma C_t$ with $t \in T$
G2	Total amount of a cost type	Total amount of a cost type "t" equals the sum total of all involved cost factors "f"	$C_t = \Sigma C^f_t$ with $t \in T$, $f \in F$
G3	Total amount of a cost type	Total amount of a cost type and influence on a cost factor. Considering the complete period of time during cloud computing services has been used or is going to be used and the period is subdivided into several periods "i". Each period comprises one month since this time period is predetermined by provider. And the entire time period consist of "n" periods.	$c^t_f = \sum_i^n c^t_{f,i}$ with $i = \{1,\ldots,n\}$, $t \in T$, $f \in F$
G4	Total amount of a cost type	Similar with G3 but here it's consider the variable $a^t_{f,i}$ that represents the variable for consumed or required quantity in period "i" and $p^t_{f,i}$ that characterizes unit costs or prices	$C^t_{f,i} = a^t_{f,i} * p^t_{f,i}$

B. Cost Type BPaaS

The BPaaS Cost Type approach makes it possible to analyze the costs or individual cost components of an IT artifact by means of a predefined scheme. Table IV. considers the BPaaS Cost of Service charged for accessing to the service system (price per period $p^{charBPaaS}_{accc,i}$ and dependent on the number of users consumption $a^{charBPaaS}_{acc,i}$). In the other hand, $C^{charBPaaS}_{acc} = \sum_{i=0}^{n} C^{charBPaaS}_{acc,i}$ is typified the Cost of Service charged for BPaaS as the whole time of periods n (i = {1….n}). The author in this research and mathematical model exclusively link the total BPaaS Cost of Service Charge, all the periods "n" in the Cost of Service System, the example is performance by the formula: $C^{charBPaaS}_{acc} = \sum_{i=0}^{n} a^{charBPaaS}_{use,i} * p^{charBPaaS}_{acc,i}$. And $C^{charBPaaS}_{acc} = \sum_{i=0}^{n} a^{charBPaaS}_{use,i} * p^{charBPaaS}_{acc,i} * x\%$ charge in the BPaaS service. Some more formulas are shown to determined the Cost of onshore shared service for BPaaS and Cost of near-shore shared service for BPaaS during all periods "n", and the largest Cost of service charge BPaaS when redesigning the business process (dependent on how much percent of business process needs to redesign) all the while of periods "n". (see more index references in table IV).

VI. BPAAS CASE STUDY

To validate this BPaaS model, the author applies all formulas following a presented Total Cost of Ownership model. In this case study, we have chosen a Cloud Computing Provider located in India (Tech Mahindra

Table IV
Formulas of Cost Types BPaaS

No.	*Name of Formula*	*Description*	*Formula*
BPaaS1	Cost of service charge BPaaS	Cost of Service charge for BPaaS in case of accessing to the service system (access price per period $p_{acc,i}^{charBPaaS}$ and dependent on the number of users consumed $a_{acc,i}^{charBPaaS}$)	$C_{acc,i}^{charBPaaS} = a_{acc,i}^{charBPaaS} * p_{acc,i}^{charBPaaS}$
BPaaS 2	Cost of service charge BPaaS	Cost of Service charge for BPaaS in case of accessing to the service system as during all periods n (i={1….n}	$C_{acc}^{charBPaaS} = \sum_{i=0}^{n} C_{acc,i}^{charBPaaS}$
BPaaS 3	Total cost of service charge BPaaS	Cost of Service charge BPaaS in case of accessing to the service system and during all periods n	$C_{acc}^{charBPaaS} = \sum_{i=0}^{n} a_{use,i}^{charBPaaS} * p_{acc,i}^{charBPaaS}$
BPaaS 4	Total cost of service charge BPaaS as performance	Cost of Service charge BPaaS in case of accessing to the system by performance and during all periods n	$C_{acc}^{charBPaaS} = \sum_{i=0}^{n} a_{use,i}^{charBPaaS} * p_{acc,i}^{charBPaaS} * x\%$
BPaaS 5	Total cost of onshore shared services	Cost of onshore shared service for BPaaS during all periods n	$C_{onss}^{charBPaaS} = \sum_{i=0}^{n} a_{onss,i}^{charBPaaS} * p_{onss,i}^{charBPaaS}$
BPaaS 6	Total cost of near-shore shared services	Cost of near-shore shared service for BPaaS during all periods n	$C_{nss}^{charBPaaS} = \sum_{i=0}^{n} a_{nss,i}^{charBPaaS} * p_{nss,i}^{charBPaaS}$
BPaaS 7	Total cost of offshore shared services	Cost of offshore shared service for BPaaS during all periods n	$C_{ofss}^{charBPaaS} = \sum_{i=0}^{n} a_{ofss,i}^{charBPaaS} * p_{ofss,i}^{charBPaaS}$
BPaaS 8	Total cost of business process redesigning service	Cost of service charge BPaaS when redesigning the business process (dependent on how much percent of business process needs to redesign) during periods n	$C_{bprs}^{charBPaaS} = \sum_{i=0}^{n} a_{bprs,i}^{charBPaaS} * p_{bprs,i}^{charBPaaS} * y\%$

BPaaS) which offers Contract Management solutions. Tech Mahindra company is a part of Mahindra Group, and the single one that launch a Managed Data Service (MDS, on March 25, 2014), a fully managed end-to-end reference data management Business Process as a Service (BPaaS) solution for the financial services industry in North America. This solution has already witnessed a significant traction in European markets. Tech Mahindra BPaaS also sponsors the Managed Data Service (MDS) solution which is designed around as a utility model and comprises three integrated components - technology infrastructure, operational outsourcing and specialized software IP [6]. The key benefits include assured data quality, operating cost reduction, CAPEX to OPEX transformation and improved operational efficiency.

Table V. denotes the basic content of this case study and explanations of the model applied in this industry. The authors offer as a state of the art a single calculating of BPaaS indexed at Tech Mahindra which tremendously contribute in the knowledge of BPaaS since in preview periods and the decision maker wants to calculate the TCO of particular providers. We collected specific data from Tech Mahindra and simulate the BPaaS service charge pricing of Contract Management Solutions for Private and Hybrid Cloud, included terms and conditions information are delivered by Cloud Store – a UK government supplier (*http://govstore.service.gov.uk/cloudstore/*) - to Public Sector. Even though Tech Mahindra also has case studies in Contract Management and other industries such as banking, financial services and institution (ITCInfoTech); oil and gas (Chevron); steel (ESSAR, ArcelorMittal); media and entertainment (Time Warner); life sciences (Gohnson and Gohnson); beverages (United Spririts) we just have prepared particular information from the Tech Mahindra's annual reports 2014 to determine the relative effects. In that sense, we claim no responsibility for the accuracy of the information; and the author is not responsible either for any misunderstanding in this representation case study. The readers utilizing this case study are free to adopt different standards and approaches as they can see others in future researches on this particular topic.

Table I
Case Study – Techmahindra Bpaas

Cost types	*Costs*
Strategic decision, selection of cloud computing services and cloud types	Expenditure of time (eot): 18h * $120 = $2,160 Information for decision-making (inf): $150
Evaluation and selection of service provider (eva)	Expenditure of time (eot): 20h * $120 = $2,400
Service charge of BPaaS (charBPaaS)	Acceess to the service system (in 12 months, 4 users and 1 contract): $138 * 4 * 12months = $6,624Offshore shared service (ofss): 4*90% = $14.4Business process redesigning service (bprs): $150 * 30% = $4,500
Implementation, configuration, integration and migration (imp)	Expenditure of time (eot): 45h * $110 = $4,950
Maintenance and modification (maint)	Expenditure of time (eot): 2h * $100 *12months = $2,400
System failture (fail)	Loss per period (loss): $40 * 12months = $480
Sum per 12 months	$21,278.4

A. Case Analysis Anthology

Our cost analyzed is the strategic decision which required 18 hours of work (average wages per hour for decision-maker and IT personnel: $120) plus costs for information material amounting to $150. (Consulting services are to be omitted since costs should be kept down). The business processes are strongly dependent on the provider's performance and the availability of service considered extremely important, this fact was determined by 99.99% in accuracy. For the identification of a suitable provider he assumes 20 hours. Since the company is quite young the planning period just covers 12 months and 4 users. Next, we also make emphasis in two months during this year are assumed to require a high level of computing power. Thus the provider charges a regular rate. The basic service is roundly at $20.00 in caparison with 4 users, 1 contract management (fee per 100 contract management per year is about $138,000) and deployment plan of 12 months which obtain $6,624.00 representing the yearly service in the system. The offshore share service is under a constructive 90% calculated in the experience of services (the case of steel industry – ESSAR company has been provided), then $14.40 is charged in concept of sharing process of service, annually the redesigning service correspond only $150.00 considering 30% as a whole service. The expenditure of time is estimated at 45 hours and price of $110.00 only this cost is considered the implementation, configuration and integration into the systems from the customer perspective. Additionally, we have examined as a

determinant factor the maintenance since this usually is an administrative and costly row in the statements from companies and users, in this case, we look at only 2 hours value at $100.00. in overall our model considers the sum per 12 months accumulated at $21,278.40.

See that costs for trainings are not accounted, for the new infrastructure and then will not change the business processes. A fully detail of this case study is presented in Table V. for instance but not at all, and only for the purpose of technical evaluation a web based, system-independent TCO software tool could be implemented, this was not our fully case since we make the formal model of the TCO of Cloud Computing Services easy applicable.

VII. CONCLUSIONS

In our case study, we have demonstrated that a general problem of Total Cost of Ownership models is entirely related with the pure cost standpoint. As we explained early in the second section of our research that even in decisions on generic services like BPaaS a quality check is important. The model was presented in the form of a mathematical approach and implemented on a real case company Tech Mahindra website that is open for the general public. Our result of the analysis of real Cloud Computing Services, a case study as well as scientific taxonomies and ontologisms advice aimed at including initial and permanent as well as internal and external training for the implementation in the first stages of development. Even though we presented a method, the awareness of indirect as well as hidden costs in Cloud Computing still is highly inapplicable or existent in the major of cases.

The BPaaS and TCO approach should be regarded as one part of a comprehensive IT cost management and as an additional method to evaluate a Cloud Computing Service. As a limitation we encounter that any mathematical formula or approaches is constructed with the limitations and therefore, need to be considered for its practical application either in this particular case or further researches. We could briefly mention some ethical or restrictive assumptions to support the reliability of Tech Mahindra who supported us through diversity of information in taking a particular focus on Cloud Computing Services. Thus, we hide cost types that particularly are existing in the internal IT infrastructure and their cost factors (cf. service system 2 and expenditure of time 4). We unknown if the company has addressed specific plans to implement a private cloud or hybrid cloud related with cost types for a complete and comprehensively evaluation since we based our model on related work and include insights from real Cloud Computing Services.

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