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CHALLENGES AND OPPORTUNITIES FOR PORT LOGISTICS IN USING BPAAS BASED ON TCO MODEL

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Abstract: *Business Process as a Service, not yet a determined taxonomy definition and computing model seems to be the next generation to free businesses and IT departments from having to worry to underlying services that support the various processes. In general, a conceptual definition of this model share equal acceptance from the private and public sector, as the entirely worldwide businesses are hoping it soon will become a model of adoption to measure services in the cloud, although it contains the lesser known and discussed cloud categories; basically its ability to directly impact short-term business transformation and perceivable business value to end-users is catching the market. However, this new business model aside from the development of Information, Communication Technology and Industrial Revolution is attracting the boundaries of Port Logistics, a single part of the biggest Maritime Industry sector; as it is undergoing with a vigorous change in terms of strategy to reduce costs, optimize the business process and maximize profits in the future sustainability scenario. In this research, the authors focus on the Business Process as a Service and how it can be used into Port Logistics industry, to begin the researches provide a literature review, analyze, develop a mathematical approach of Total Cost of Ownership and evaluate the same case study under the applicability of Business Process as a Service in order to emphasize which challenges and opportunities Port Logistics need to take in account before these hubs make plans for expanding its growth, competitive advantages and benefits of its applicability. The results shown in this study certainly prompted flexibility, agility and business impact.*

Keywords: *Cloud Computing Services, Business Process as a Service, Total Cost of Ownership, Mathematical Model, Port Logistics, Case Study*

I. INTRODUCTION

A. Primary Purpose

Port industry is a key sector for any country to boost the economy and see viable growth; however, its development depends on innovated strategies to delivery an

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efficient and sustainable port system as an important facilitator or driver into the enterprises direction to keep competitive advantage in our demanding market. Different models such as: Smart port, E-port or U-port is not the "strange" name any more. Port needs to be capable to obtain an integrated, intelligent, reach global productive, check for logistics chain and maintainable policies toward worldwide performance. Port logisticis a special form of integrated logistics system; they are hubs with irreplaceable important nodes into the logistics chain. Aside all these peculiarities Information Technology (IT) to optimize the integration of port resources and strengthen logistics activities are essential and classified with core factors [1]. The development of IT is deployed in various trades and occupations, particularly, IT techniques nowadays include embedded sensors in different components of the society to connect them within one network (electrical networks, railroads, bridges, tunnels, highways, buildings, water systems, dams, oil-gas pipelines, etc.);all these infrastructure is called Internet of Things (IoT). With the emerging of IoT and the Industrial Revolution, a new conception is mentioned– the so-called Industrial Internet – is a concept that could stimulate the informatization of the logistics industry and offer new business models like the Business Process as a Service (BPaaS).

Port Logistics and the adoption of Cloud Computing Services can bring a "Silk Road" since the cloud phenomena propose considerable cost advantages. Traditionally, a logistic system includes transportation and other activities such as inventory control, handling, sorting, warehousing, retailing services, shipping lines, tug, and towage, pilots, boatman, agents and forwarders, shippers, etc. all these characteristics previously mentioned are needed in order to achieve positive results in the cost-effectiveness and decision making process [2]. For instances, in the supporting innovation of commercializing port logistics services, the maritime committees are the key factor that should be also included as an entirely segment. In the quest to reduce costs organizations have applied different techniques to manage a diversity list of daily cost, one example is the model called: Total Cost of Ownership (TCO), with this archetypal an opportunity to explore fortunes and benefits in relation of innovative and change-willing organizations have been undercover in theory and practical views [3].Therefore,BPaaS is a promissory background to exploit in detail and bring to the real applicability.

By quite a margin, the largest concentration of the Port Logistics market industry have seem benefits while applying a TCO model, however, if we take in consideration that commonly companies do not manage an internal IT infrastructure plan and rigorous methodologies of pricing or support inducted methods [4] then methodologies and operations have concentrated from outside or rounding policies. By that sense, in this research model, we procure to answer if the costs correlated with Cloud Computing Services are really near to the ground? As it is explained later in this study our mainly establish shows that cost types and external factors are frequently the main reason to underrate the services by practitioners. In this paper,the research group adapted a Business Process as a Service and Total Cost of Ownership approach for Cloud

Computing Services to be applied into the business dimensions of port logistics and its system operations. 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 in order to identify challenges and opportunities for port logistics; the approach is limited to two sections: development and evaluation of the formal mathematical model. In other words, our model properly fits practical requirements and supports decision making while discovering Cloud Computing Services. 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). The writers have adopted a BPaaS cited from references that simply brings a new market and upgrade the existing system or process without much infrastructure cost for its applicability in the enterprises.

This research has been divided as follow,

Section on denotes 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, we distinguish the term Cloud Computing, Total Cost of Ownership (TCO) and Business Process as a Service (BPaaS), ensure the administrative adoptions and peculiar innovations accompanied by ideas from Cloud Service Providers to facilitate and guarantee quality of service and decision making to the Customer Users adopting this model.

Section two resumes the previous related work, importance of Industrial Internet, Cloud Computing Services in port logistics industry as an engine of innovation, and underlyingour research approach.

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

Section four is dedicated to bring together the assignment of cost factors and Total Cost of Ownership model applicability.

Section five contains the details and development exemplifies of our mathematical approach under the Total Cost of Ownership and introduces how to evaluate such case study in regards of BPaaS to compare both models; 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 practice of rating differently to generate outstanding results for Cloud Service Providers and benefits for the Cloud Users, through series of formulas that were deployed.

Finally in the last section, we suggest the challenges and opportunities for port logistics using BPaaS, draw the conclusions, commitment limitations and our findings adoption of applying BPaaS model to leverage benefits in any industry as an integrator of Cloud Computing Service Architecture in future research.

B. Outline Definitions

Cloud Computing across a wide variety of explanations is intended to allow the client to avail of different services without examination in the core 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." [5].

Our output analysis contributes to explain three service layers already known but not pretty much applied or defined 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 its different categories of Cloud Computing Services, an immensurable list of research suggest that companies are forward and backward to apply a Total Cost of Ownership (TCO) approach. The Total Cost of Ownership (TCO) [6] 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.

In addition to the previous layers, the market is moving to the adoption of Cloud Computing Services model called: 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 [7]. 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 [8]. However, not full applicability is executed yet due its maturity and adoption constraints.

II. RELATED WORK

We target the literature review 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", Business Cost. We next utilized these key words to manage a database and

cooperate each other to receive scientific, peer-reviewed papers. However, we do not provide further information on how to develop a software tool to calculate the cost. And also to the best of our effort, we are working in the development of a comprehensive BPaaS and TCO model perspective; consider what kinds of challenges and opportunities for port logistics industry could do be listed as international standards.

A. Previous Research on 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 the data (often in real-time), and use the final mining to control and adjust operations. Currently, digital technology has largely enabled efficiencies within the enterprise and revolutionized Business to Consumers (B2C) companies. In the long term, 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 [9]. 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 [10].

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 [11]. Y. Chen, *et al.* (2014) argued that IoT is in reality a concept of intelligent logistics; IoT-based intelligent logistics system and services are using advanced technology, RFID (Radio Frequency Identification) technology, sensor technology, information technology, computer technology, video technology, network technology to strongly boost the modern logistics industry to digital, integrated and intelligent on Cloud computing. All these services need to be in a great low cost for "business – enterprises and customers – users" [12].

According to Jeff Immelt, GE chairman and CEO, at the GE Minds and Machines 2013 conference held in Chicago, USA; businesses and leading technology enterprises 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 economically sense to customers, workforce productivity and better decision-making.

B. Cloud Computing Services

Cloud computing can be seen as a collection of services [14] and also with 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 with the conception of applying "on-demand service" to external customers over the Internet". The cloud computing paradigm differs dramatically from today's IT model because it is decouples into data and software from the servers in addition to storage systems running them that can enables IT resources to be dynamically allocated and delivered as a service, either in component parts [15] or conjunct of group services.

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 how enormous companies could achieve server utilization rates similar to cloud providers which are been achieving from their platforms and by adopting data center best practices, all together could drive down server TCO by more than 50% [16].

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 economical business model"[17]. 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" [18]. Cloud service provider would host cloud services for cloud service consumers; it will depend on which cloud services model and type of services that customers need and which cloud service developer could build to the end-users [19].

As we previously denoted in the introduction section of this research, at the present time, cloud computing services model is described and peculiar divided into four layers: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) and Business Process as a Service (BPaaS) [20]. Deloitte (2012) showed the trends of logistics technology are rapidly picking up recently and cloud computing is one of the multiple emerging view that are invested by the top logistics firms, manufacturers, distributors, etc. . Furthermore, companies are capable to use cloud services could see in the short term some benefits such as low cost footprint, enables collaboration, scalable, integration, and real-time visibility– for instances, Port Logistic sector usually demands the consumption of SaaS based models[21]. It will be an incredible chances for cloud providers to exploit this potential market and compete in this business race.

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." [22]. 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, common business processes and contract negotiation services.

BPaaS can also be designed to automate certain businesses utility services such as billing and shipping. BPaaS can be an internal cloud services as well as external services originated from different cloud vendor types in the form of public, private and hybrid virtual scenarios. In overall some other literature reviewers like Strebel *et al.* [23] and Kondo *et al.* [24], they conclude in their findings that in the long run cloud computing services are inexpensively more beneficial but require high start-up investments. Consequently,short and high performance tasks are recommendable to apply a commercial Cloud Computing Service. In the BPaaS model, 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 market and customers wishes [25].

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.This prediction includes the tracking of eight sub segments such as: cloud payments (17.8%), cloud advertising (17.1%), and industry operations (15.1%); in the meantime all together could generated a global CAGR (Compound Annual Growth Rate) of 15% [26]. 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, applications and infrastructure) from a single services provider" ideally it 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 Small Medium Business (SMBs)that 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 [27].

III. OUR TECHNICAL MODEL APPROACH

A. Cycle Development

We provide a general scope on this BPaaS and TCO approach going through several cycles of development. The process of our research and model design is detailed 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 TCO and BPaaS models may be continuously in review and iterative improvement.

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).

Table I
BPaaS Pricing Scheme

Provider	*BPaaS Services*
Genpact	Charge by monthly or yearly Services: Finance and Accounting (FA), Human Resources (HR)
Salesforce	Monthly charge per user by group, professional, enterprise and performance Services: Customer Relationship Management (CRM)
Zoho Creator	Monthly charge per use by standard, professional and enterprise Services: FA, HR, CRM
Tech Mahindra	Monthly charge per user, Yearly charge per organization Services: Procurement BPaaS (Contract Management, Invoice Management, ect.), FA, ERP, HR, CRM
eBuilder	Montly or Yearly charge per user Services: 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 user Services: Payroll processing, Recruitment, FAO/payables and collections, Freight audit
Fujitsu Limited	Yearly charge per user with team package and enterprise package Services: Business workflow and integration (Fujisu RunMyProcess)
IBM	Will be charge after registration, monthly or yearly Services: Procurement, HR, Sales and Commerce, FA (eg. Payroll, printing and expense reporting)
Oracle	Yearly charge Services: 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)

Moreover, this scheme also can be classified in some other based pricing models, 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, classified a list of Providers and details the BPaaS Services which 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.

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 [28]. 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 discovered 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.

V. BPAAS WITH TOTAL COST OF OWNERSHIP MODEL – CASE STUDY ANALYSIS

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) [29].

Table II
BPaaS Cost Factors

Cost types	*Cost factors*	*Description*
	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

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∈ T, f ∈ F is the referred Total amount of a cost; for instance the $C_f^t = \Sigma_i^n C_{f,i}^t$ is total amount of a cost type and influence on a cost factor with i = {1,…,n}, t∈ T, f ∈ 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 $C_{f,i}^t = a_{f,i}^t * p_{f,i}^t$ where it is consider the variable $a_{f,i}^t$ that represents the variable for consumed or required quantity in period "i" and $p_{f,i}^t$ that characterizes unit costs or prices.

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

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"	$C_t = \Sigma C_t^f$ 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.	$c_f^t = \sum_i^n c_{f,i}^t$ 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 that represents the variable for consumed or required quantity in period "i" and that characterizes unit costs or prices	$c_{f,i}^t = a_{f,i}^t * p_{f,i}^t$

$p_{acc,i}^{charBPaaS}$ and dependent on the number of users consumption $_{acc,i}^{charBPaaS}$). In the other hand, $C_{acc}^{charBPaaS} = \sum_{i=0}^{n} C_{acc,i}^{charBPaaS}$ is typified the Cost of Service charged for BPaaS as the whole time of periods n (i= {1….n}). The authors 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: $C_{acc}^{charBPaaS} = \sum_{i=0}^{n} a_{use,i}^{charBPaaS} * p_{acc,i}^{charBPaaS}$. And $C_{acc}^{charBPaaS} = \sum_{i=0}^{n} a_{use,i}^{charBPaaS} * p_{acc,i}^{charBPaaS} * x\%$ charge in the BPaaS service. Some more formulas are shown to determined the Cost of onshore shared service for BPaaSand 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).

C. BPaaS Case Study

To validate this BPaaS model, the authors apply all formulas following a presented Total Cost of Ownership model. In this case study, we have chosen a Cloud Computing Provider located in India (WiproFinance and Accounting (F&A) BPaaS) which offers NetSuite's cloud based SaaS platform solutions.

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 and dependent on the number of users consumed)	$C^{charBPaaS}_{acc,i} = a^{charBPaaS}_{acc,i} * p^{charBPaaS}_{acc,i}$
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}	$C^{charBPaaS}_{acc} = \sum_{i=0}^{n} C^{charBPaaS}_{acc,i}$
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	$C^{charBPaaS}_{acc} = \sum_{i=0}^{n} a^{charBPaaS}_{use,i} * p^{charBPaaS}_{acc,i}$
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	$C^{charBPaaS}_{acc} = \sum_{i=0}^{n} a^{charBPaaS}_{use,i} * p^{charBPaaS}_{acc,i} * x\%$
BPaaS 5	Total cost of onshore shared services	Cost of onshore shared service for BPaaS during all periods n	$C^{charBPaaS}_{onss} = \sum_{i=0}^{n} a^{charBPaaS}_{onss,i} * p^{charBPaaS}_{onss,i}$
BPaaS 6	Total cost of near-shore shared services	Cost of near-shore shared service for BPaaS during all periods n	$C^{charBPaaS}_{nss} = \sum_{i=0}^{n} a^{charBPaaS}_{nss,i} * p^{charBPaaS}_{nss,i}$
BPaaS 7	Total cost of offshore shared services	Cost of offshore shared service for BPaaS during all periods n	$C^{charBPaaS}_{ofss} = \sum_{i=0}^{n} a^{charBPaaS}_{ofss,i} * p^{charBPaaS}_{ofss,i}$
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	$C^{charBPaaS}_{bprs} = \sum_{i=0}^{n} a^{charBPaaS}_{bprs,i} * p^{charBPaaS}_{bprs} * y\%$

WiproL.t.d is a global information technology, consulting and outsourcing company due to supports customers do business better. Nowadays, Wipro penetrates in logistics industry with "Finance and Accounting BPaaS" product to lead the cloud-based financials, ERP and commerce to help their clients manage and control their finance and accounting processes on in a 100% cost model, evaluate the business process performance, set up business outcomes and improvement goal. This company wants to deliver winning business results through its deep industry experience and a 360 degree view of "Business through Technology" to service users create outstanding and flexible businesses. Rubens Siva, CFO, Global Payments Brazil said "Wipro executed a BPaaS solution for enabling the Finance, Accounting and Payroll business processes end-to-end, for our Brazilian operations. The solution platform was deployed in 5 months, to provide operational efficiencies and full regulatory compliance, in an innovative zero-CAPEX business model"[30].

For ethical reasons, some data has been modified as the company does not release the all formulas and its BPaaS model. Table V denotes the basic content of this case study as simulation, numerical example 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 Wipro 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 Wipro and simulate the BPaaS service charge pricing of Finance and Accounting Outsourcing (FAO) Solutions such as e-billing, electronic invoicing for Private and Hybrid Cloud, in case of using NetSuite-based FAO platform for logistics transportation industry that Wipro offers. We also express that Wipro does not purport to be a complete description of the case study or development referred in this material. While we just have taking care in the preparation of the above statement of the company. In that sense, we claim no responsibility for the accuracy of the information; and the authors are 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.

Case Analysis Anthology

Our cost analyzed is the strategic decision which required 20 hours of work (average wages per hour for decision-maker and IT personnel: $130) plus costs for information material amounting to $180 (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 24 hours. Since the company is quite young the planning period just covers 12 months and 2 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 of NetSuite software pricing is roundly in the range of

Table V
Case Study – Wipro FAOBpaas

Cost types	*Costs*
Strategic decision, selection of cloud computing services and cloud types	Expenditure of time (eot): 20h * $130 = $2,600 Information for decision-making (inf): $180
Evaluation and selection of service provider (eva)	Expenditure of time (eot): 24h * $130 = $3,120
Service charge of BPaaS (charBPaaS)	Acceess to the service system (in 12 months, 2 users): $129 * 2 * 12months = $3,096 Offshore shared service (ofss): 2*90% = $3.6 Business process designing service (bprs): $180 * 30% = $5,400
Implementation, configuration, integration and migration (imp)	Expenditure of time (eot): 40h * $100 = $4,000
Maintenance and modification (maint)	Expenditure of time (eot): 2h * $100 *12months = $2,400
System failture (fail)	Loss per period (loss): $50 * 12months = $6000
Sum per 12 months	$26,799.60

$99.00 to $129.00 per user per month based on annual contract in caparison with 2 users and deployment plan of 12 months which obtain $3,096.00 representing the yearly service in the system. The offshore shared service is under a constructive 90% calculated in the experience of services then $3.60 is charged in concept of sharing process of service, annually the redesigning service correspond only $180.00 considering 30% as a whole service. The expenditure of time is estimated at 40 hours and price of $100.00 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 for maintenance and $6000.00 for a year system failure. In overall our model considers the sum per 12 months accumulated at $26,799.60.

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.

VI. CHALLENGES AND OPPORTUNITIES FOR PORT LOGISTICS

The primary difference between a Cloud BPaaS and traditional business process outsourcing is a service-oriented software application that has well defined interfaces and is standardized to be configured across many organizations that support best

practice through software models. It should be capable of supporting multiple programming languages and multiple deployment environments which can also handle massive scaling. BPaaS can be viewed from two perspectives, a user and provider:

- User: a model in which provides standardized business processes on a pay-as-you-go basis. This allows access to shared resources (people, application, and infrastructure) from a single service provider.
- Provider: the delivery of BPO services that are sourced from the cloud and constructed for multi-tenancy. The pricing mechanisms are typically consumption-based or subscription-based

The promise of BPaaS is centred on the notion of configurable computing resources that can be rapidly provided and released with minimal management effort or service provider interaction. Ensuring service compliance is often considered a challenging task particularly for BPaaS, which has a global reach, is a daunting task and presented many issues.

In order to support this business model, some other providers developed eBuilderBPaaS - Order Fulfillment Cloud Process solution and success stories of logistics consumers DHL and Alfalaval."In 2013 Google joined Amazon, Microsoft and IBM as a major provider of cloud computing services for the corporate market. Google made a splash by announcing it was cutting prices for cloud computer processing and storage, while guaranteeing uptime of 99.5 percent. The addition of a new competitor in the public cloud means more available infrastructure and lower costs for BPO providers looking to provide solutions beyond offshore labor arbitrage models. These companies foresee a future of automated business process as a service (BPaaS) applications over the web, shared by multiple clients and paid for on a consumption or subscription basis." [31]

Level of Challenges in Port Logistics

- Data privacy and Security

The problem of data privacy occurs when data identifying individuals are collected, either in digital form or another and controls are inadequate or non-existent on the disclosure, this root cause series of issues related with data privacy, legal protection of privacy. In general and data privacy varies worldwide, the information privacy and security are related but are not the same, an organization can ensure the information but do not protect privacy, the fundamental problem is that often the information is protected in its container, such as can be a file system, database server, but the protection is not implemented in the data itself, so when the data are transferred away the trace of them is lost.

Neither the United States nor the European Union have specific regulations of Big Data, however, there are laws that regulate the collection, use and storage of certain

types of personal information, such as financial, health and lower data. Likewise, a growing regulatory oversight, evidenced an emphasis placed by the Federal Trade Commission called Data Brokers [32], based on Article 29 on data protection in the USA and principle of purpose limitation of Big Data as a previous appreciation on the topic. In order to comply with regulations and stay updated on regulatory issues, organizations must define an initial set of laws that need to renew periodically.

Given the risk and related requirements, ensuring the privacy of customer information and protecting critical corporate data are "top-of-mind" issues for management teams. In case of Port Logistics, there is basically a list of reasons such as: understanding the risk or landscape (regulatory and legal) related with the information sector to information collection and transmittal, inadequate organizational policies, insufficient training and not verification of third parties 3PLs among others. [33].

– Policy and government

Open government initiatives encourage governments to share government information for creating a collaborative environment and promoting innovation for further creating better services for citizens and society that would not be possible otherwise, leading to a transformation of government into a so-called "smart government."

In terms of Korea initiated the Public Information Sharing Center (PISC) in 2005 through a steering committee, and officially launched it in 2010 as a center under the Ministry of Public Administration and Security (MOPAS) [34]. The Open Government initiative allows government data, available digitally; to be shared and integrated to produce value added information products and citizen services. Particularly Port Logistics from Korea can take diversify advantages from such kind of regulations and policies. In the international perspective, government agencies by adopting measures or policies could be in a timely manner to reflect the citizens' feedback about policies and public services like customers to government (C2G sharing). In addition, Port Logistics needs to consider the explosion of mobile devices while the governments could allow citizens to demand more agile and fully context aware government services. Thus, the third key point of smart government is that the citizen-related data collected for public services also should be efficiently shared among government organizations to create more integrated personalized services that can be delivered to citizens anywhere, anytime to any device, transcending space, time and device differences (G2G sharing) [35].

Even though some efforts have been done, there are still many challenges to be solved in order to achieve secure and smart government policies in terms of opportunities of data sharing for Port Logistics. The current study focuses on the BPaaS and how a new business model environment, where the citizen data or information documents are exchanged and shared by the government agencies for their administrative processes and customers get to know better information and services through leveraging this new BPaaS model.

– New business model

In the business model alternatively there is different proposes either to connect business or simply open opportunities and advantages exploration. By referring to any action research or approaching these practices are rooted in managerial and entrepreneurial experience through the exploration and exploitation of business opportunities and competitive advantages. In case of Port Logistics, the practices of visioning, strategizing, performing and assessing involve managerial and entrepreneurial experience.

The concept of adopting new business model in Port Logistics is pretty new. In fact, the term business model has become one of the keywords of contemporary business (Zott, Amit, and Massa, 2011; Onetti et al., 2012). The term denotes not only a practical tool but also an object of analysis in research (Zott et al., 2011). However, understanding the dynamic side of business models—especially how they are created or changed in practice—by referring solely to existing research, is problematic from two standpoints [36].

Our research denotes that Port Logistics before to start with visioning, business model creation as a practice it needs previously to be concerned with the certainly future policies in its adoption as it is about not only creating something new but it also requires questioning some interrogates boundaries whether the organization or the team in the operational levels have the opportunity and the advantages required to do business changes since assessing can be seeing as a crucial element of business model transformation.

In addition, our comments are concerning that there may be conflicting views regarding with the future scale and magnitude scope in the steps of re-exploring business opportunities and advantages held by the firm, it absolutely can add some stemming from prior action. Thus, in this research we denote the border that may exist between strategizing and performing a new model, certainly it can become blurred during the phase of ending the cycle of business model transformation.

Level of Opportunities in Port Logistics

– Optimize the TCO

BPaaS is in its early applicability and therefore, the full implementation in the companies and particular users may take time. There is not surprise then to motivate different managers across the companies to measure and analyze the elements of Total Cost of Ownership (TCO) sufficiently to understand and optimize and procure to combine step by step a new business model inside the organization in order to likely to become an industry leader.

While conducting our research some analysis has been made and we certainly specify that optimizing the TCO model is a difficult process for organizations specially when it comes into the stages of creating sustainability and guide plans, but this

document contains a particular case study that show the payoff is worth the effort. Regularly companies that succeed at optimizing TCO have exceptional leaders who demand cooperation between functional groups. Port Logistics must recognize that optimizing costs is a function of operations, maintenance and the purchasing department working toward the common goal of lowering total costs [37].

The opportunity to obtain corporate and strategy benefits from a new business model (BPaaS) into Port Logistics will allow to generate a better analysis used as a basis for decision making in almost any industry or business—including manufacturing, computer systems, transportation, buildings, real estate, medical and laboratory equipment. TCO analysis provides the critical foundation for making some decisions changes about: Budgeting (Capital & Expense), planning, staffing, vendor selection, inventory requirements, lease vs buy decision in case of (hardware and software, IT industry). The biggest reason is that Port Logistics cost information under the BPaaS analysis for each event during the life of an equipment item, like a repair or replacement, is only available and traceable if someone enters the event and associated costs into a system and measure based on the plan of payment chosen.

In conclusion, BPaaS model and analysis by itself will not solve the immensurable problems encounter in Port Logists, rather than selling such idea this particular sector needs leaders who continuously strive to improve performance, supported by workers and managers who are willing to absolutely change their behavior and embrace new, more efficient ways of doing things under a new perspective that demonstrate efficiency and acquisition cost with minimum standards, instead procure a very positive return on investments during the shift from TCO to BPaaS boundaries and concepts application into the industry that is obtaining maturity in terms of BPaaS model [36-38].

– Value creation

Porter's (1985) value chain framework analyzes value creation at the firm level. Value chain analysis identifies the activities of the firm and then studies the economic implications of those activities. It includes four steps: (1) defining the strategic business unit, (2) identifying critical activities, (3) defining products, and (4) determining the value of an activity [39].

Porter defines value as 'the amount buyers are willing to pay for what a firm provides them. Value is measured by total revenue. A firm is profitable if the value it commands exceeds the costs involved in creating the product (Porter, 1985: 38). Value can be created by differentiation along every step of the value chain, through activities resulting in products and services that lower buyers' costs or raise buyers' performance [39-40].

If we associate Porter's value concept with the BPaaS we will find out that currently the NIST definition of Cloud Computing does not recognize BPaaS as a distinct service model. The expression (business) "process as a service" (BPaaS) was coined by Wang

et al. [41]. Meant thereby is the process level collaboration and outsourcing process steps.

As we stayed early in our research, the shift from TCO to BPaaS models, they can be operational and functionality implemented step by step and even put together the costs to customized and optimized them, thereby leading to multi-tenancy, i.e. different instantiations and governance for each cloud client [42]. The resultant processes can be executed in the cloud, provided the necessary data as it is made available. Port Logistics value creation and adoption of BPaaS can obtain a complete outsourcing (the whole process is managed in the cloud) or a partial outsourcing (only parts the process are managed in the cloud). The entirely revenue may be appreciated into the cost to outsource IT functions across the entire stack (infrastructure, platform and service) as a means to provide on-demand access to virtualized resources and finally providing a better service information to customers and other interested parties across the organization.

VII. STRATEGY AND BPAAS VALUE CREATION

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, numerical example and implemented on a real case company Wipro website that is open for the general public. Our result of the analysis of real Cloud Computing Services, a simulation study, 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 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 Services. As a limitation, we encounter that any mathematical formula or approaches is constructed with the constraints and for this reason,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 Wipro 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.

BPaaS remains at a relatively early stage of conceptualization and maturation, but it will ultimately mean minimal management effort or coordination for specific

company processes, freeing up time for core/other business activities. It may hence be worthwhile to further review extant research and associated methodologies in the wider business process outsourcing literature to further explore whether the same outcomes hold for BPaaS. Similarly, establishing comparative data between BPaaS and other cloud service models may prove to a fruitful endeavor. It is clear that as BPaaS evolves, further challenges will present themselves. BPaaS introduces specific orchestration challenges within the chain of service provision and as such may also impact emerging models such as Cloud Brokerage.

VIII. CONCLUSION

The rapid pace between TCO and the implementation paradigm of BPaaS seems to provide valuable suggestions about possible sources of its proposal value creation. As we have seen, many of the insights provided from our cumulative research helps to determine the strategic management and operational background before approaching the concept into the Port Logistics sector. However, the multitude of the BPaaS value drivers suggested in the literature raises the question of precisely which sources of value are of particular importance in this new tendency BPaaS, and also it becomes important to consider whether if not aunique value drivers can be identified in the context of TCO vs BPaaS. We have refer through a study case how to drawn the attention to the fact that each theoretical approach have as a final stage the purpose of reducing costs, this last pattern might explain the relation between both concepts and value creation limitations when applied in the context of highly interconnected electronic markets.

In the meantime, we believe thatthis conceptual and case study on BPaaSreinforces the need for an identification and prioritization of the sources of reducing costs, generating value creation in Port Logistics. But also it needs to measure a list of potential challenges and opportunities before attempting to be adopted.We begin this novel research process by grounding a new model of sources to create cost reduction and injecting motivational suggestions of its value creation in Port Logistics industries.

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