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Contemporary Models of Information Resource Utilization on Cloud Computing - Observed From the Aspect of Cost and Efficiency

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Abstract: ***Cloud Computing represents a new business model, and not a new technology developed to a certain period of time. This model of cloud computing dates back to 1960 and is related with John McCarthy and his belief that someday computation may be prearranged as other public utilities. This type of using computing resources emerges from evolutionary development of technologies during the last 50 years. Based on Internet, Cloud Computing as its main aim has to make available an easy scalable access to computing resources in anytime from anywhere and considering the economic aspect as one of the most researched and important aspects, that means to provide its services in a cost effective way. In this article the concept Cloud Computing will be explained and also how can an organization decide whether to accept or not this business model by evaluation and comparing the cost, benefits, and risks, respectively, advantages and disadvantages, which enables companies by focusing in their core business activities to achieve savings (competitive advantages) in other areas.***

Key-Words: ***Cloud Computing, advantages, disadvantages, cost, benefits.***

I. INTRODUCTION

Cloud computing represents the information technology's sphere that is currently causing such great interest and expectations like no other**.** Despite its growing popularity, Cloud Computing concept still remains a term not clear enough, despite the existence of a variety of definitions. Trying to help perception of this concept, which in fact represents a disruptive model of IT, who's Innovation, is partly technology and partly business model, below we will give some definitions which in our opinion could help in this direction.

Cloud computing [1] is the consequence of advancement and embracing of existing technologies and patterns. Aim of cloud computing is to let users to benefit from all of these technologies, without the necessity of profound knowledge about or expertise with apiece one of them. Cloud aims to decrease expenses, and assists users to remain focused on their essential affair instead of being obstructed by IT impediments. Cloud computing [2] is more regarding a new manage running and a business model than it is about a new technology as such, the cloud computing model carries more than a transients similarity to the mainframe models that were predominant in the 1960s and 1970s.

Cloud computing, from computer science [3] prospective, describes a model for outsourcing of computer services, alike to the manner in which the supply of electricity is outsourced: users can just use it without the need to be concerned where the electricity comes from, how is produced, or transported. Simply they pay monthly for what they spent. Likewise is the idea behind Cloud computing: the user can straightforwardly use storage, computing power or specially crafted development environments, without any concern on how these work internally. Cloud computing essentially is a model of system architecture aimed for internet-centered computing. Cloud computing is the expansion usage of computer technology on the Internet.

Cloud computing is a model[4]for enabling ubiquitous, convenient, on-request network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be quickly provided and unconfined with trifling management effort or service providers interference. Cloud model has following 3 dimensions:

- Essential characteristics, five in total;
- Service models, three in total; and
- Deployment models, four in total.

The International Organization for Standardization (ISO) has released two new standards [5] for cloud computing, in an attempt to "put some order in the chaos" for users. As opposed to the NIST ruling which only proffers Platform as a service (*PaaS*), Software-as-a-Service (*SaaS*) and Infrastructure-as-a-Service (IaaS), the newly ISO ruling has seven different cloud service groupings, adding in Network-as-a-Service (*NaaS*) and Data-Storage-as-a-Service (*DSaaS*).

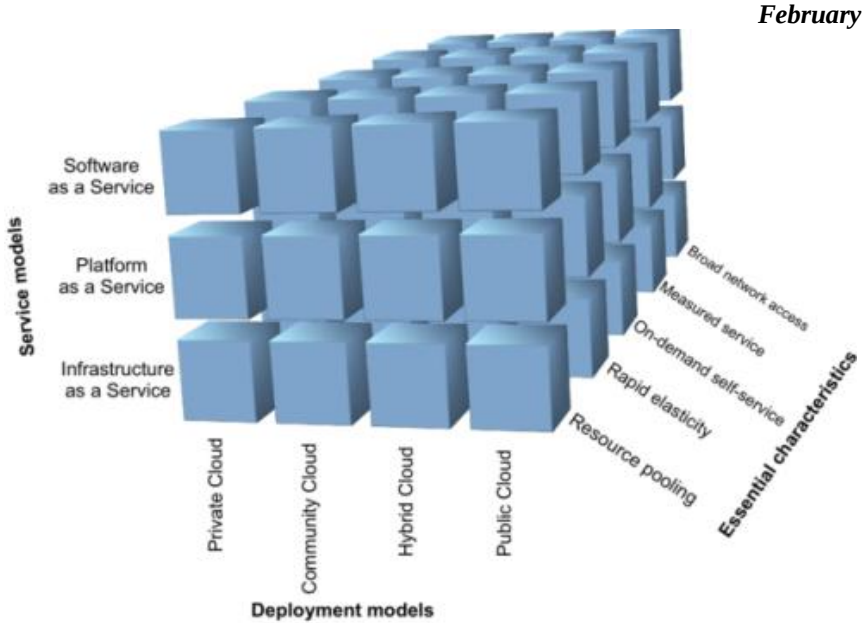


Fig.1 the Cloud Cube

ISO also enlarges on NIST's 2011 meaning on cloud deployment models, putting in community cloud to Public, Private, and Hybrid.ISO released two standards: the "ISO/IEC 17788", and the "ISO/IEC 17789".

Cloud Computing includes the following five essential characteristics: On-demand self-service, broad network access, resource pooling, rapid elasticity and measured service. They can be expounded as follows:

- **On-demand self-service**. This means that Cloud Computing consumers can decide to utilize or not computing resources, such as server time and network storage, as needed automatically without requiring human intervention.
- **Broad network access**. This means that Cloud Computing resources are available over the network and can be accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, PDAs, laptops, and workstations).
- **Resource pooling**. This means that the Vendors Cloud computing resources (e.g. Network bandwidth, virtual machines, memory, storage, capacity, processing power) are pooled to serve multiple consumers using a multi-tenant replica, with various physical and virtual resources dynamically allocated and reshuffled in accordance with consumers requests. Generally the costumers are not aware of the precise locality of Cloud computing resources, but they may be able to indicated he place if they need.
- **Rapid elasticity.** Depending on demand Cloud computing resources can be quickly and in some cases automatically (elastically) provisioned and released, to scale rapidly outward and inward. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time.
- **Measured service**: Customers usage of the providers' resources and services is automatically monitored controlled and reported offering a high level of transparency for the customer and vendor. This means that Cloud computing customers only pay for the computing resources they have used(pay per use**,** just like electricity and water).

The NIST definition goes on to organize clouds into three cloud computing service models:

- Software-as-a-service (SaaS)*;*
- Platform-as-a-service (PaaS)*;*
- Infrastructure-as-a-service (IaaS).

But one of the biggest confusions over cloud comes from the fact that it actually applies to a number of different layers in the "stack". Software as a Service (SaaS): or Cloud applications services represent a software distribution model which deliver software as a service over the Internet, eliminating the need to install and run the application on the customer's own computers and simplifying maintenance and support. In the SaaS layer, the Cloud service provider or Vendors hosts the software upon their servers' applications and made available to customers over a network, typically the Internet. SaaS provides complete software solutions. This software could be, Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Documentation Management, Google Gmail, Microsoft Office 365, Salesforce.com, etc.

Platform-as-a-service (PaaS): In the Cloud Computing Stack the PaaS places the mixture of both, infrastructure and application, and represents the succeeding layer down from SaaS. As an alternative to ready-made applications, development tools, databases or services, PaaS provides platforms (without downloads or installations) for developing such applications and services, e.g. Business Intelligence (BI), Amazon Web Services, Relational Database Service

(RDS), Google's AppEngine, and SalesForce.com's,Force.com, etc. This platform can be used for building novel applications and services.

Infrastructure as a Service (IaaS): Down from PaaS, the IaaS layer is the next stratum and it provides storage and infrastructure resources (characteristically for a platform virtualization surroundings) as a services. The resources provided to the consumer at this level, is the provision of virtual servers, storage, networks and other fundamental computing resources, that organizations use on a pay-per-use basis. Consumers are able to deploy and run arbitrary software, which can include operating systems and applications. Amazon's *Elastic Compute Cloud (EC2*) and *Simple Storage Service (S3)* are examples of IaaS,

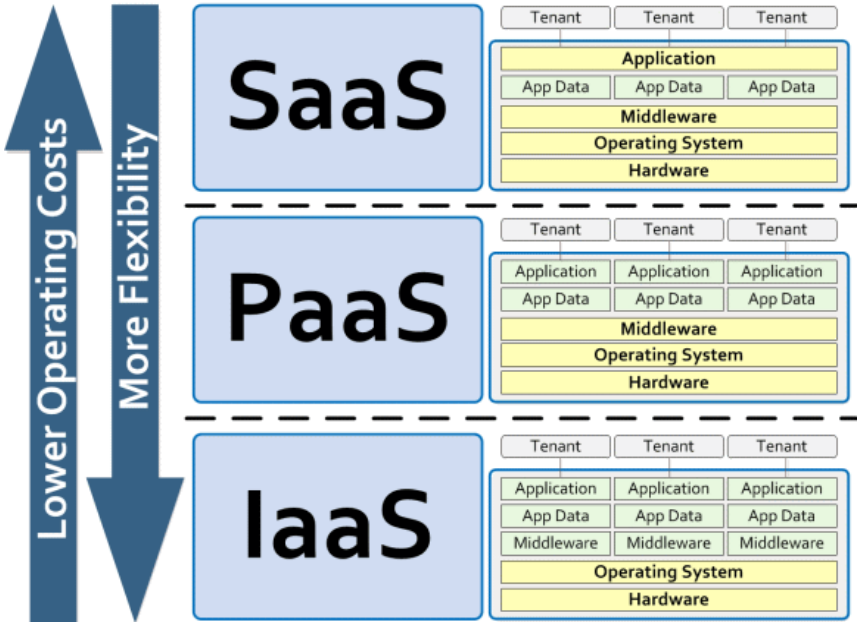


Fig.2 Cloud delivery models

Depending on way in which cloud system is used, NIST define the following four Cloud Computing deployment models:

Private clouds – The cloud infrastructure is operated solely for a specific organization, because it is built for the consumption of internal user, eventually it may be extended to business partners, and is managed by the organization or a third party. A private cloud is protected by public access with a firewall.

Community Cloud-In the community deployment model, the cloud infrastructure is shared by several organizations with the same policy and with a shared concern, or otherwise said, where organizations have similar requirements and seek to share infrastructure so as to realize some of the benefits of cloud computing.

It is accessible to a controlled group of institutions e.g. all banking institutions, defense agencies, even educational institutions etc. Cloud providers ensure some sort of separation for resources used by different users, known as multitenancy.

Public Cloud-Generally it is accessible to everyone. A public cloud sells services to anyone on the Internet and they are owned and operated by a cloud provider. Public cloud services may be free or offered on a pay-per-usage model. Examples are *Amazon Web Services EC2* and *Google AppEngine*.

Hybrid Cloud –It is a combination of two or more different Cloud computing deployment models (private, community or public), connected by standardized or proprietary technology. Organizations build hybrid cloud to serve both internal and external users. The Public cloud is for interacting with external users, and the private cloud is for use by internal people**.**

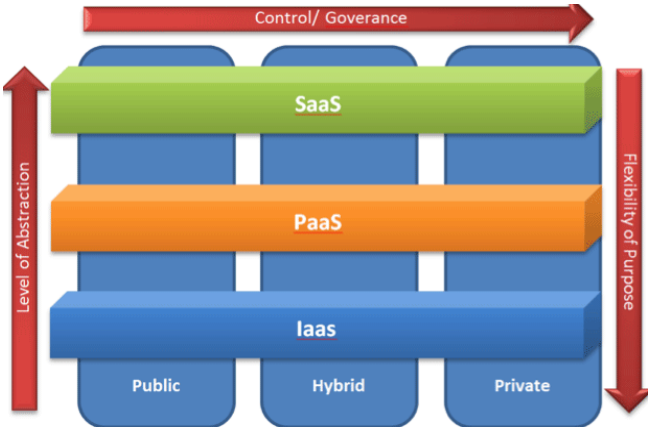


Figure3. Service/deployment model

II. ADVANTAGES AND DISADVANTAGES OF CLOUD COMPUTING

1. Advantages of Cloud Computing

Cost Efficiency - This is the biggest advantage of Cloud computing. The expenditures of managing and maintaining IT infrastructure are significantly reduced by shifting towards cloud centered solutions. Instead of improving existing or purchasing new hardware and equipment a business can recourse towards the efficient and effective assets of a cloud provider.

Disaster Recovery -Cloud service providers shall previously had set up disaster-recovery plans and procedures to mind out for most of the issues. Cloud computing makes easier data backing up and recovering because the data is located in Cloud and not on a sole hardware device. Therefore businesses companies operating through cloud providers do not need to take care of with the complex disaster-recovery management. Every year in airports alone, approximately 800,000 notebooks gone astray which can have significant financial inferences, but when everything is stored in the Cloud, information can still be accessed no matter what happens to a single computer.

Pay-Per-Use Model- Cloud computing services are typically pay-as-you-go billing model meaning that usage is metered and paid is only what was consumed. Users pay only for the resources they used, eventually aiding them maintain their expense slow. As this *pay-for-what-you-use* model mimics the way power and water are paid, sometimes it is referred to as "Utility computing".

Scalability and Performance- Conventional methods for acquiring hardware and software are timely and costly. When using the cloud computing method purchase and setup hardware manually are avoided. One of the biggest advantages of the Cloud computing is provision of better flexibility for companies by encountering their variable requests, bandwidth or number of users scaling up of services and resources dependable on the business trends.

Automatic Software Updates- Cloud service provider, consistently upgrades and updates the system with the latest technological features. Usually these automatic updates are by default included in the Cloud subscription fees.

Limitless storage capacity-Cloud computing provides almost limitless storage capacity. Standard computer's 300-600 gigabyte hard drive capacity is insignificant contrasted to the hundreds of peta bytes (a million gigabytes) available in the cloud. The worry of running out of space is ruled out and as a consumer you do not have to think about upgrading the hardware

Device Diversity and Location Independence. Services offered by Cloud computing enables user to access computing resources and capabilities through different platforms consisting of networks and devices desktop computers, tablets, laptops, mobile phones, workstation, etc. An End-user has the freedom of not just accessing these services from any device, but also from any location too.

2. Disadvantages of Cloud Computing

Control and Reliability-The biggest fear of cloud computing is found in its major benefit – the ability to outsource the IT burden to a specialized vendor or provider. Sure it sounds great, but with a move to the cloud you do give up the in-house control of a traditional IT department.

Constant Internet connection and Downtime- Cloud Computing works online and absolutely dependent on network connections. This brings in many drawbacks such as; if network connection is slow or not available then you would not be able to work.Even on a fast connection, web-based applications can sometimes be slower than accessing a similar software program on your desktop PC. This is due to the problem of latency. For example, if the cloud data centre is located off shore client connection time to your data may not be as fast as you hope for

Transferability- One of the major disadvantages of cloud computing is the implicit dependency on the provider. This is what the industry calls "vendor lock-in"**.**If you want to move from one cloud to another cloud,that is from one hosting provider to another,have to face more problems.It's not easy to move to other hosting provider because of migration process will take time to transfer files,which indirectly cuase your business to be off line for some time/days.

Security - Cloud based solutions are exposed on the public internet and are thus a more vulnerable target for malicious users and hackers. Nothing on the Internet is completely secure and even the biggest players suffer from serious attacks and security breaches. In Cloud computing, since every component is available on the Internet the risk of the entire environment being highly vulnerable to hackers and unwanted users is always there.

III. ECONOMIC JUSTIFICATION -VALUE AND/OR COST SAVINGS

Cloud computing represents [6]a major departure from previous industry practice and may fundamentally change the nature of computing. While mainframes required expensive upfront capital investments and later client servers optimized agility for end users, the cloud offers the advantages of both approaches without the disadvantages of either and can improve efficiency by a factor ten.

Researches on the benefits of cloud computing is relatively a new field. Many of the studies into the benefits of cloud computing fail to quantify the benefits, rather they just determine the general business benefits expected from implementation of Cloud computing, as mentioned above in this paper.

But why is this so? Can we really have the same problems with quantification of both kinds of benefits such as the so-called hard and soft benefits? It is difficult to understand the true value of cloud computing without analyzing and understanding the soft benefits which bring to the business, migration from traditional IT infrastructure to the Cloud computing. Even for companies that have implemented and gained some experience in cloud computing, it's not easy to quantify costs and especially the so-called soft benefits of cloud services, e.g. how to quantify the ability of the company

to respond with agility and flexibility to business needs and demand fluctuations, which with existing data center architectures cannot be achieved, but with implementation of Cloud computing concept is possible?

They are a number of reasons why this might be so: Accounting standards do not dictate line by line financial reporting on ICT spending, so interviewees may not really know precise changes in cost structure.

Sometimes, companies might favor their information to stay confidential.

In many cases, a decrease in ICT costs has been felt for a specific service, but overall the total ICT expenditure has increased as the business itself has grown, meaning the firm could not segregate the influence of cloud-based costs from other ICT expenditure.

The value of using cloud computing can be found in hard benefits just as much as soft ones, but the effect just from hardware investments savings alone, is huge. In the following text some of the most frequently benefits will be mentioned that can be found in various sources in broader economic terms. With migration to the Cloud computing firms do not need to invest in ICT infrastructure, nor to purchase hardware, or to buy software license. The advantages are minimal forthright spending, greater return on investment, transform CAPEX into OPEX, rapid deployment, customization, flexible use, faster time to market, environment footprint reduction(due to high energy consumption) and solutions which can take advantage of new inventions. Some other benefits to users include: scalability meaning that cloud computing provides limitless processing and storage capacity; reliability meaning that cloud computing over the Internet offers access to applications and documents anywhere in the world; efficiency meaning that Cloud computing enables businesses to relax their resources and consequentially to focus more on novelty and product development; Pay-per-Use or Pay-as-You-go, meaning that customers have access to potentially limitless resources but only pay for what they actually use, and also another latent gain is that personal data might be better safeguarded in the Cloud.

Generally, the advantages of Cloud Computing are congregated from three comprehensive groupings:

1. Direct Cost savings (decreased expenditure per output unit)- the main and most recognizable financial advantage of cloud computing is the direct expenditures savings from alterations inside the organization (e.g. abridged IT repairs) and external economies of scale (e.g. big ICT centers accommodating the IT arrangement);
2. Productivity Enlargements (improved output per unit of cost) – commercial modifications might be achieved deprived of the demand for comprehensive capability planning, alterations to currently operating technology or novel technology procurements;
3. Innovation (capacity to provide novel and progressing produces)-companies can enlarge extra advantages in commerce elasticity and vigor, partnership, and bringing novel products and services to marketplace.

As it could be seen from the text above, first two categories can be easily quantified, which is not the case with the third category which will be elaborated further in this paper. The reason why both categories are easy to be identified and quantified in a figure 4 and Table 1 will be presented below illustrating thus that fact in the best possible manner
It could be seen in the figure 4in what manner companies usually are disburse their ICT funds and how entire ICT expenditure can be fragmented into segment.

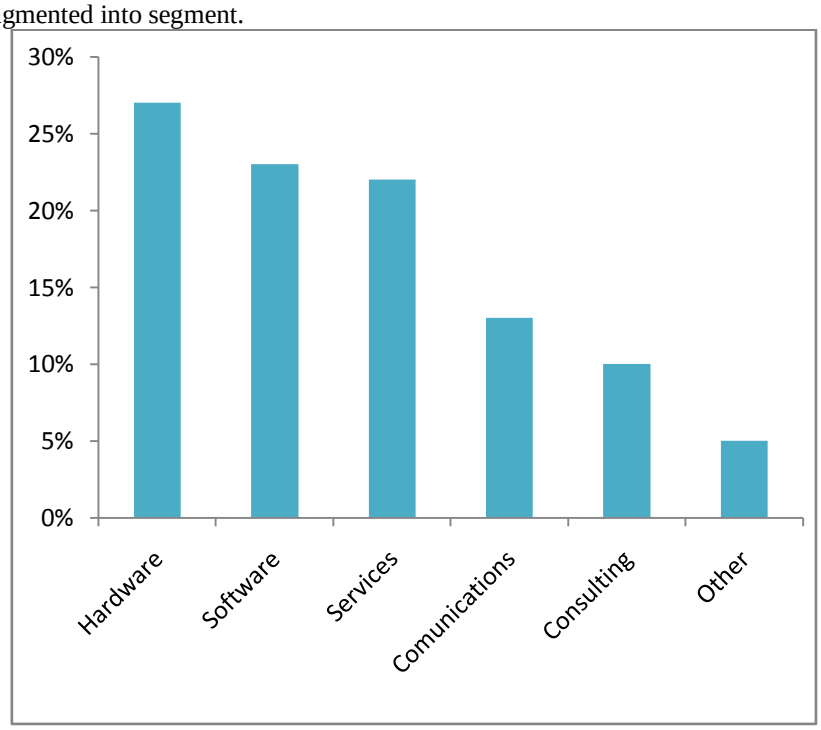


Fig.4 ICT spending by segment in 2011

Fig.4 shows the itemization of ICT spending over the 5 segments and other, and illustrates that almost 70 % of spending are paid for hardware, software and services; segments which are typically transferable to the cloud.

Table I shows the costs and benefits associated with a cloud solution that differ from those for a traditional on-premises solution

Solution elemnt	*Traditional on-premises solution*	*Cloud solution*
	UPFRONT COSTS	
Capital expense	Initial purchase of software and hardware	None
	network infrastructure enhancements or additional facilities	Pay-as-You-go subscription pricing that covers all software, hardware,networking, storage,monitoring,security and administration
	Thirrd-party monitoring,test tools and security products	
Design and deployment	Profesional services can cost upto 3 x initial software purchase	Defined and provided using consistent set of best practices
	Staff or contractors required to research design, integrate, test, tune, launch and train	
	RECURRING COSTS	
Ongoing Infrastructure costs	Hardware replacement every 3-5 years	Provided by the supplier
	Additional networking equipment and bandwidth	
	to accommodate incremental growth	
	Software maintenance and upgrades	
	Conectivity (Internet or government networks)	
Ongoing operational costs	Application operation, support and monitoring as well as upgrades	Provided by the supplier
	Recruitment, training and certification	
	of support staff	
	Data centre/hosting costs including power and cooling; PUE rating can be 2.5 or higher*	Some suppliers offer a PUE as low as 1.1

*PUE-Power usage effectiveness (ideal value=1.0)

$$PUE = \frac{\text{Toal Facitity Pover}}{\text{IT Equipment Pover}}$$

The benefits for businesses to migrate from conventional IT infrastructure into Cloud Computing one, are numerous, but the most mentioned advantages are simultaneously those which are easier to identify and quantify and this is without doubt Cost savings.

These expense savings are generated by following the four different mechanisms [7]**:**

1. By reducing the opportunity cost of operating technology;
2. By allowing for a shift from capital expediture to running expediture;
3. By reducing the total cost of ownership (TCO) of technology;
4. By providing companies the capability to add business value by orientation of the focus on core processes.

For proper decision making reasons and for identifying and for quantifying the cost and benefits which are brought by this migration, the four above mentioned mechanism will be briefly explained in the following section:

1. By reducing the opportunity cost of operating technology –

This mechanism we will try to explain by means of the so-called opportunity costs and the so-called Pareto principle. By definition[8]in microeconomic theory, the opportunity price of a choice is the price of the best substitute forgone, in a case in which a choosing has to be made amid some mutually exclusive options given limited funds. " The cost related to the next-best choice available to someone who has picked among several mutually exclusive choices. It is a key concept in economics. Opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time, pleasure or any other benefit that provides utility should also be considered opportunity costs" The Pareto principle [9] (also known as the 80–20 rule, the law of the vital few, and the principle of factor sparsity) says that, for lots of events, about eighty percent of the consequences originate from twenty percent of the reasons, but the most acknowledged usage of the rule is the selling 80-20 rule emphasizing that eighty percent of profits for a commerce is derived from twenty percent of clients.

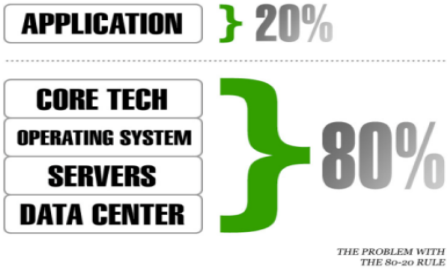


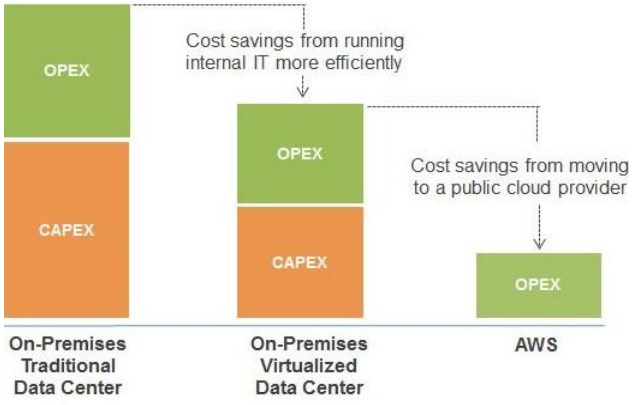
Fig.5 Rule 80% -20% in Information Technology

The IT is not an exception to this rule. Gartner report claims that the IT maintenance comprises almost eighty percent of overall IT spending. It is also being considered that the 80-20 rule happens typically inside IT and connects to time, just as must as it relates to financial expenses. Extending Gartner's findings to companies operating their own IT center with network infrastructure, it is theorized that only twenty percent of the time and effort relates to running applications, where overall commerce value is concentrated, is really about running those applications themselves.

Cloud computing concept changes this report and allows IT departments to devote eighty percent of their time on principal business processes, then around eighty percent of IT time and spending is emaciated on procedures which do not generate any new valuables for the company. This capability to shift from twenty percent of time and money assigned to principle commerce work to eighty percent, show the current on premise IT archetype's inadequacy much evidently than in the opportunity costs which companies are paying to handle their own IT needs. This explanation of opportunity cost and 80-20 rule, enables us to make easier the identification and quantification of costs as well as the benefits and at the same time this concept to be used to make choice to either keep on premise IT or shift to the Cloud computing model. Not opting the Cloud computing presents the advantage due to optimal usage of that eighty percent. Simply, shifting to the Cloud computing might do the differentiation for a firm between being twenty percent efficient, or being eighty percent efficient.

2. By permitting for a shift from capital expediture to running expediture –

There are many organizations that still build and maintain their own datacenters even though that it is not part of the core expertise of the company and operated inefficiently. Those organizations with own datacenters spending [10] over thirty percent of their budget on infrastructure (i.e., Hardware, Software licenses were generally a spending that emerged on the balance report), but moving some or all of their businesses to the Cloud, might salvage somewhere from ten to twenty percent of their annual IT fund. Savings which come as a result of such transformation from CapEx into OpEx, might be either repaid to the organization or being reinvested in expansion and novelty. By definition possessing an asset is usually considered being a Capital Spending. It demands payment for the overall asset and the price becomes an entry on the firm's balance report. While by migration to the cloud, that means distancing from CapEx is un questionably appealing to companies, it is trough Total Cost of Ownership that the financial benefits of Cloud Computing turn out to be largely tangible and clear.



*****AWS = Amazon Web Services*

Figure.6 Cost reducing capabilities of Cloud Computing

3. By lovering the total cost of ownership (TCO) of technology –

To analyze the cost–benefit or to compare the costs between on premise (own datacenter) options and Cloud Computing, it is important to accurately assess the true cost of both options. This is possible through the use of the Total Cost of Ownership (TCO), as a financial estimate method since TCO considers not only the investment cost, but also cost over time for operation and maintenance. The TCO for Information Technology (was originally developed by Gartner Group in 1987) is generally used as a means of addressing the real costs attributing to owning and managing an IT infrastructure in a business. To manage[11]their own data centers, companies typically face significant investment in capital outlay and ongoing costs, such as servers, network equipment, the required software, e.g. in the form of operating system licenses, and infrastructure such as uninterruptible power supply, cooling, or internet connection, as well as ongoing costs for employees. In contrast to own data centers, cloud computing at the company need not own servers nor own datacenter. Companies no longer require large capital expenditures in the physical hardware and management costs of operating and maintaining it.

The cost of ownership disparity of thirty to forty percent between conventional IT (own IT center) and public cloud services is foreseen to persist, if not enlarge, throughout the course of next few years, propelling enlargement in the marketplace for high-quality and securely external-hosted cloud capability at over forty percent annually. TCO categorizes costs rising from 2 main factors - direct and indirect, and represents a good tool to define and measure the volume of direct and indirect costs related to specific technologies.TCO calculation uses cost structure that includes costs for hardware, software, staff, and facilities, and represents direct, tangible, and measurable costs. ROI represents a ratio between the benefits from investments in relation to the amount invested, and is commonly articulated as a percentage to reveal the cash flow subsequent from an investment over a period of time.

Table II. Cloud Computing: On-premise vs Cloud–financial comparison

	Capex	Monthly Opex	Year One	Year Two	Year Three	Year Four	Capex	Year Five	Year Six
Support									
External IT Contract		1023	12276	12276	12276	12276		12276	12276
Hardware Refresh									
Server	3698						3698		
Workstations	3900						3900		
Installation Labour	2688						2688		
Licensing Refresh									
Windows Server OS	2203						2203		
Terminal Server License	606						606		
Exchange Server	883						883		
Exchange User Licences	967						967		
Anti-Virus			300	300	300	300		300	300
Back-Up									
On/Off-Site Back-Up (15% growth)		240	2880	3312	3808	4380		5037	5792
Other Factors to Consider									
Licensing Compliance			115	121	127	133		140	147
Vendor & License Management			575	603	634	665		699	733
Server Upgrades					1000	1000			
Cooling		30	360	360	360	360		360	360
Electricity (£30/server/month)		90	1080	1080	1080	1080		1080	1080
Insurance (0.5% of hardware)		18	222	222	222	222		222	222
Capex Load Factor (2%/year)		25	305	305	305	305		305	305
TOTAL COST	**£14,945**	**£1,426**	**£18,113**	**£18,579**	**£20,112**	**£20,721**	**£14,945**	**£20,419**	**£21,215**

On premise TCO

	Capex	Monthly Opex	Year One	Year Two	Year Three	Year Four	Capex	Year Five	Year Six
Cloud Solution Fees									
Migration/Project Works	2520								
Solution Fee and Support		1623	19474	19474	19474	19474		19474	19474
SSL Certificate			130	130	130	130		130	130
Workstation Refresh									
Installation Labour									
TOTAL COST	**£2,520**	**£1,623**	**£19,604**	**£19,604**	**£19,604**	**£19,604**	**£0**	**£19,604**	**£19,604**

Cloud TCO

	Capex	Year One	Year Two	Year Three	Year Four	Capex	Year Five	Year Six
TCO for On-Premise Solution	14945	18113	18579	20112	20721	14945	20419	21215
TCO for Cloud Solution	2520	19604	19604	19604	19604	0	19604	19604
Additional Savings and Revenue		6999	6999	6999	6999		6999	6999
ROI	**£12,425**	**£5,508**	**£5,974**	**£7,507**	**£8,116**	**£14,945**	**£7,814**	**£8,610**
Total ROI = £62,595								

ROI

As TCO and ROI is familiar to most executives and can be used as the basis of comparisons to select between value-generating or cost-avoiding projects, which mean it can be used to decide whether or not to migrate to cloud computing concept.

4. By providing companies the capability to add business value by orientation of the focus on core processes –

Despite these cost savings however, Cloud Computing offers significant extra value to organizations by the fact that it allows them to focus on their core business. It is our contention that this value side of the equation is even more compelling than any cost savings possible.

Innovation-Non Measured Benefits

As it is mentioned earlier in this paper, many firms devote a considerable amount of their IT funds for maintaining running services and infrastructures, leaving fewer resources available for innovation and flexibility and in the case of migration to the Cloud Computing concept, these costs savings amounts are easily measurable.

Cost and benefits as initial propelling interest in cloud computing can be amplified by further non-measurable advantages. Some of non-measurable benefits of cloud computing can be translated as a faster "time to market"(faster in response to customer requests or change reactions), construction of new services that can be built with cloud computing, and/or adapt existing services what in essence represents increased business agility and organization flexibility.

Although the Industry comprehends that the Cloud computing brings obvious cost advantages, never the less CIOs are having problem reaching a true solution on the commerce value that cloud can provide beyond cost lowering, what means that for the true Economics of Cloud Computing non-measurable benefits must be considered also in form of business agility and organizational flexibility. To define a true benefits of migration to the Cloud Computing corporate decision makers in addition to "how much capital and operational expense can be cut with cloud?" should also ask the question: "How will cloud improve revenue or company's competitiveness?".Newly published business-agility study, company's decision makers relate cloud computing straight to business responsiveness, which means that forward thinking CIOs and other inventive business leaders looks further than simple cost reductions, to the business agility and organizational flexibility. The Review also shows how cloud computing helped CIOs to make a stronger correlation between IT changes and business transformation that cloud computing can provide.

In February 2011, independent market-research firm AbsolutData conducted a business-agility survey for VMware® in which 600 corporate decision makers from around the world took part in. Survey. Answers[12] show that over eighty percent of respondents concur that agility is modestly or more than modestly connected to improving company's profit, cost and risk profiles, with sixty six percent recognizing business agility as a primacy.

Examination indicates that firms which are unwilling to accept Cloud computing paradigm due to sensed of dangers might essentially be deterring quicker profit increase, bigger and extra enduring cost reduction, and more effectual management of risks and reputational hazards.

- Cloud computing may transform the whole company to be more "business agile" and "responsive," corresponding to answers of sixty three percent of business leaders.
- Organizations with enterprise-wide deployments think that cloud computing can help achieve ten percent higher business agility results, like lowering expenditures and rising key revenues.
- Organizations with enterprise-wide cloud deployments have3 times higher probability to accomplish business agility that is "much better than the competition."

Fig.7 Based on McKinsey & Company's business agility Framework, Diagram shows that the respondents are of the opinion that the cloud can help companies to improve their experience, speed up the execution of operational projects and quickly adapt to market options.

IV. SUMMARY

Cloud computing is an emerging computing model and currently is one of the most important IT trends. It represents a paradigm in which IT services are provided from a third party via the Internet as services in highly scalable and cost effective manner. As a critical factor for the successful introduction of cloud computing concept by the companies certainly is the economic importance. Advantages for an organization to migrate from conventional IT infrastructure towards Cloud Computing are numerous, but the greatest usually mentioned advantages are simultaneously those which are easier to identify and quantify and this is without doubt Cost savings.

We have seen that the value of using cloud computing can be found in hard benefits just as much as soft ones, but the effect just from hardware and software investments savings alone, is huge.

With migration to the Cloud computing, users in addition to the benefits that come from advantages (such as scalability, Reliability, Efficiency, Pay-per-Use or Pay-as-You-go, rapid deployment, faster time to market, environment footprint reduction, and solutions which might make use of novelties) do not need to buy and possess their own IT infrastructure, purchase hardware, or buy software licenses. Advantages include depleted forthright costs, better return on investment and finally transform CAPEX into OPEX.

It can be conclude that Cloud Computing concept brings to the companies that accept this, significant cost and time savings and also lower risks and obstacles in the introduction and implementation of new IT services and also can be a great asset and opportunity for them. However, this can be achieved if they do in advance a proper and accurate assessment of all the benefits particularly of economic aspects.

During the process of decision making for migration or not to the concept of Cloud, the importance of the benefits that come from the so-called soft benefit should be noted, as well as difficulties in their quantification.

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