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Investigation the Role of Cloud Computing in the Business Value for Optimal Criteria

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Abstract: Cloud computing is everywhere. Pick up any IT focused magazine or visit any IT website or blog and talk about cloud computing will be there. However, it is also a fact that not everyone agrees on what it is and how it can be used. Ask ten different professionals what cloud computing is and you will get ten different answers.in this paper, Investigation the Role of Cloud Computing in the Business Value for Optimal Criteria The focus of the study is on analysis the investment made on adoption of cloud computing. The analysis covers both financial as well as non-financial benefits and associated costs. The same has been carried out based on an analysis framework. It also highlights the need to carry out a comprehensive risk analysis based on a risk framework taking into account various risks e.g. vendor related, technological, architectural, regulatory etc. The criticality of change management initiative for any such transition is also dealt with. This has been evaluated from the perspective of arriving at the impact of organizational change. The aspect of opportunity cost and hence ROI associated with the proposed cloud initiative is also highlighted in the study. As part of its analysis, in order to bring in objectivity, the study has proposed framework for cost benefit analysis and risk analysis. Based on the analysis carried out it has provided some recommendations which need to be considered in general while carrying out such transitions.

Keywords: Cloud Computing, IT Business Managers, Business Value, financial as well as non-financial benefits.

1. Introduction

Cloud computing is everywhere. Pick up any IT focused magazine or visit any IT website or blog and talk about cloud computing will be there. However, it is also a fact that not everyone agrees on what it is and how it can be used. Ask ten different professionals what cloud computing is and you will get ten different answers.

One school of thought considers this buss about cloud computing as mere hype and is very critical about the application of cloud concept in every aspect of computer world. In 2008, the then CEO Larry Ellison once ridiculed the hype of cloud computing by saying that the computer industry seems more fashion driven than women's fashion industry itself. Cloud computing gets its name as a metaphor for the Internet. It can be categorized as a computing model rather than as technology in itself. In this model "customers" plug into the "cloud" to access IT resources which are priced and provided "on-demand". Delivered over an Internet connection, the "cloud" replaces the company data center or server providing the same service. (Ross &Beath, 2002).Thus, Cloud Computing is simply IT services sold and delivered over the Internet.

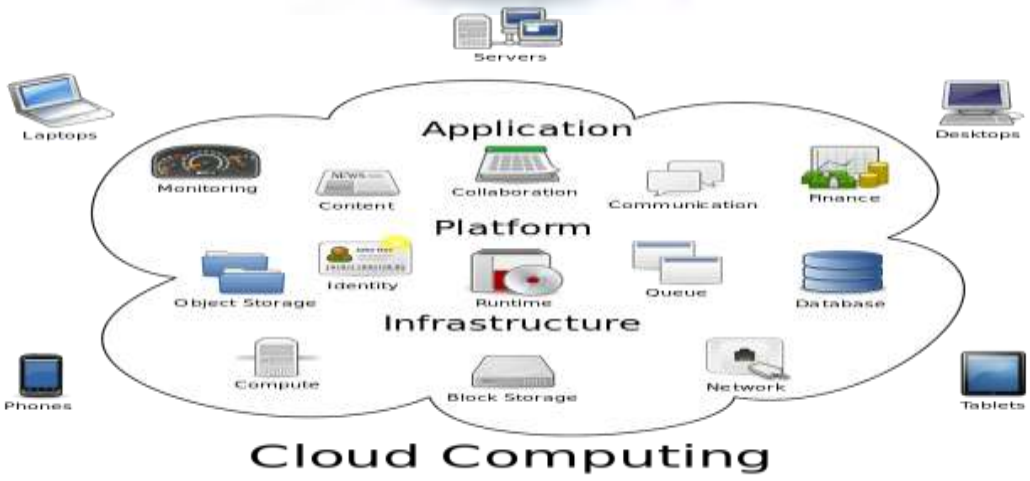

Figure 1 show cloud computing components

Essentially, IT resources are rented and shared among multiple tenants. As such, cloud computing promises to cut operational cost and capital cost. Further it lets IT department focus on strategic issues rather than fighting with the administrative issues. However, there are certain caveats which must be dealt in order to realize the real benefits of cloud computing. This report endeavors to look closely on these caveats.

2. Analysis of Investment

The given case clearly depicts that along with numerous benefits that can be leveraged, cloud computing also brings in various risk associated with its adoption. The real challenge lies in counter balancing these risks so that the leveraged benefits outperform them. Having higher initial cost associated with it, both financial as well as non-financial, the investment made for cloud computing need a rational justification for the return on the investment (ROI). Else, the initiative can back fire and can ruin the strategic intent for adoption of cloud computing. This calls for a thorough analysis on the various aspects associated with the investment made and the benefits intended to be realized by adoption of cloud computing.

2.1 Financial Benefits and Costs

Adoption of any new business process, strategy or technology, has an underpinning of justification of financial benefit over the incurred cost. The same applies to cloud computing also. The fact that the cloud computing leverages its benefits by sharing the infrastructure with group of users, helps rationalizing the financial benefits for all the users. However, easier said than done, it is very vital but difficult to exactly calculate the expected financial benefit that is going to be realized against the cost that is going to be incurred. The same is also apparent from the given case study.

Nevertheless, there are various ways to deal with this. One way is to adopt a metrics-based and objective methodology for inclusive investment analysis of cloud computing initiative (refer Annexure-I). it works on the proposition that in spite of a large number of features and functions provided by any IT initiative, there is always limited number of explicable, understandable and applicable capabilities that such initiate will bring to any enterprise.
The financial benefits and the cost associated with adoption of cloud computing forms part of that. Broadly, the costs and the benefits are arrived at over three categories, which are technology, personnel and operational. Like benefits accrued by direct cost saving on infrastructure and manpower. Similarly the direct cost can be attributed to downtime in terms of lost business and cost associated with the training needs on new infrastructure scenario.

2.2 Non-financial Benefits and Costs

In this paper highlights that, apart from direct financial implications, there are some non-financial cost and benefits associated with the initiative of cloud computing. The nonfinancial benefits can be realized in terms of better quality and ease of access. Another aspect from which these non-financial benefits of the adoption of cloud computing can be seen is that of the agility brought in the operations. It can be described in respect of reduction in turnaround time for processes and operations being carried out. However, being subjective in nature from the perspective of relation between the turnaround time and benefits accrued, it difficult to be expressed as direct financial benefit (refer Appendix-II). Accordingly, the measurement criterion may vary for different outlook. However, there are various cost and benefit attributes which are falling in both tangible as well as intangible category, depending on the perspective.

As described in the given case, there can be various non-financial costs associated with the adoption of cloud computing. These can be expressed in terms of attentions and time taken up by maintaining the systems on cloud. However, the extent of the intangible cost of adoption of cloud computing is meager in case the adoption is successful. If not, then the extent of its intangible cost not only outperforms the benefits derived, it also affects the future proofing of the IT infrastructure. It becomes very important to gauge both the intangible cost and benefits associated with cloud computing so that the action plan for the adoption of the same should have a cost benefit analysis. Somehow, the change in organization attitude towards clouds computing is more affected by these intangible or non-financial costs and benefits rather than the tangible ones. Thus, in spite of being subjectively captured and expressed, the non-financial costs and benefits are more appropriate drivers for the perception of such IT initiatives.

2.3 Risk

The analysis of risk associated with the adoption of cloud computing is the most critical part of its feasibility evaluation. The knowledge of the possible risks helps in determining the ways to mitigate the same in advance and helps prepare a complete roadmap with appropriate contingency. The failure in evaluating the associated risk of transition can cause havoc and irreparable loss to any enterprise.The analysis of risk should be carries out from the perspective of every stakeholder and the mitigation plan should establish clear accountabilities for them. Though, the risk cannot be determined accurately in

advance, the appropriate risk analysis can bring down the cost of failure drastically. Moreover, the risks can be diverse (refer Appendix-III) like regulatory, technological, architectural, vendor related etc. In order to make sure that all the know risks have been evaluated; a risk framework can be used. Among all the evaluated risks, the security risk is most severe. The data being outside the premises is always susceptible to threats. Secondly, the risk associated with vendor experience and reputation is also critical. However, it can be mitigated well by proper vendor evaluation. There is a direct bearing of risk mitigation with the cost of adoption. The cost can outperform the benefits in case the risks have not been taken care. Other way round, if mitigated properly, the benefits derived out of the transition and be increased exponentially.The type and extent of risk associated with the adoption and transition is dependent on many factors. The criticality of system to be transitioned is the vital one to determine the same. Another factor that is very important is the pace of transition. The risk proportionately increases with the increase in the pace at which the transition is carried out. Further, the selection of vendor also plays a prominent role in risk mitigation. The choice of vendor should be done keeping in mind the size, scope and compatibility issues.

The methodology for the risk analysis is very subjective as it would vary from organization to organization and from project to project. As such, the stakeholders themselves are the right people to analyze and prepare the mitigation plan for the adoption of cloud computing.

2.4 Organizational Change Impacts

Like any other business initiative, adoption of clod computing is also seen through skepticism by a school of thought. An organization can observe vary high resistance against such transition. However, such organizational resistance is not always misplaced. There have been many shockingly bad instances of failed transition that it becomes difficult to make people adopt a positive attitude.As such, the success of such transition project needs a robust change management plan which should take into account all the stakeholders. The transition calls for a change in way of doing business by many stakeholders. Thus it is very important to make all of them understand the nuances of the proposed transition.One of the possible and effective ways to execute the same can be by making the effected party understand the risks, benefits of taking that risk and the fallback adopted in case of failure. By understanding these aspects, the fear of unknown can be taken care off. Moreover, making people aware of the potential operational incentives that can be achieved at individual level by realizing the enterprise wide benefits can make the change management process very easy.

One way to do away with the subjectivity involved in measuring the impact is by bringing in the objective measurement framework for organizational change impact (refer Appendix-IV). It will be evaluating the connections between business context and IT investments. Any organization, based on its policy can assign weightings across various impact factors and then can score them over a scale. The weighted average score can then be arrived at to establish an overall impact index. As per the framework, strategic alignment of IT investment strategy with the realization of the enterprise's business goals and objectives is highest. Further, the impact of direct payout is also moderately high as there are discrete and understood benefits which can be derived out of the proposed CC project. The impact of risk can vary from minimal to high depending on how well the risks are analyzed and mitigation actions are put in place. But it is important to keep in mind that the change management efforts which need to be incorporated cannot be an afterthought. It must be planned and executed well in advance so that the proposal of any such transition does not have any shock factor associated with it. The change management initiative should have a provision of two way feedback i.e. both top down as well as bottoms up. The effective communication channel will ensure desired organizational change.

2.5 Impact of Not Doing Anything

This aspect of adoption of cloud computing is associated with the economics involved with the proposed transitioning. It can be attributed to the opportunity cost associated with cloud computing, the cost of forgoing the next best alternative. To understand this better, let us take an example of an instance wherein from the perspective of total cost of ownership, having physical servers would be more economical than the cumulative cot of cloud transition over the lifecycle of these physical servers. However, the fact that the cloud allows the incurred costs to be proportionately spread over the ebb and the peak of demand, may allow the monetary resources to be invested in the short term initiatives with better returns. Thus by just going by TCO analysis, many such "opportunities" would be lost by not choosing the cloud.

Further, the cost saving made by adoption of cloud can be reinvested into the organizations core business which has better ROI (refer Appendix-V). The ROI can be evaluated in terms of capacity and its utilization. The capacity can be adjudged in terms of storage space as it is the most critical factor for the cloud transition. It can also be evaluated in terms of bandwidth which determined the speed of the service. The utilization however can be evaluated directly based on the uptime and the volume of use. The ratio of the capacity to the utilization would indicate the ROI.

3. Recommendations

Based on the multifaceted analysis carried out above, some recommendation from the business value perspective can be highlighted.

3.1. Carryout a comprehensive cost benefit analysis

The cost that need to be incurred for adoption of cloud computing is affected by plethora of factors. It becomes very essential to precisely consider all of them. Any cost head which is missed out while carrying out the evaluation can distort the expected ROI. Thus it is highly needed that the sources of benefits and the associated costs should be comprehensively analyzed. This means that cost and benefits should not be analyzed in isolation but should be evaluated in tandem with risk analysis. Moreover, as the cost and benefits are analyzed across various verticals, it is very important that all the stakeholders get involved in its evaluation.

3.1.1. The cost benefit analysis should be coupled with risk analysis

It becomes very important to visualize every possible risk in terms of associated cost. As such, all the possible risks are factored into the cost benefits analysis to arrive at acceptable level. For example, the cost associated with operations cannot be fully arrived at until it is coupled with the risk associated with security of data and vendor's capability, which ranks high among all the risk analyzed.

3.1.2. Let every department or stakeholder get associated in the comprehensive cost benefits analysis

The analysis should not be restricted to the top executives. Rather it should be called from every associated department so that the chances of missing any aspect are minimized. For an example, as per the analysis the cost associated with operations as well as knowledge transfer cannot be precisely arrived at without involvement of operations and human resources department.

3.2. Start preparation with modification in organizational impact

The preparation for the cloud transition should be started with building the appropriate outlook among the involved stake holders. Convincing the related parties for a mutually agreed goal is most time taking and difficult process. Thus as soon as the strategic intent of adoption of cloud computing is laid down, parallel work should start on organizational change management initiative.

3.2.1. Involve all the stakeholders for desirable strategic alignment

The organizational change initiative for strategic alignment would be halfhearted and would not fetch desired goal if the involvement is not from all the quarters. To avoid any loose end, a shared plan should be chalked out. The impact of strategic alignment is most critical to bring in desired positive organizational impact.

3.2.2. Put in place free and fair feedback mechanism

The organizational change management initiative for strategic alignment and setting up new business process should be successful only if all the associated parties get a fair chance to express their concerns and get a chance to get rid of their undue apprehensions. This is possible only when a proper feedback mechanism is put in place.

4. Limitations of the Study

The proposed study has undertaken the business value proposition for adoption of cloud computing. However, the report is generic in nature and is not pointing to any specific scenario. Thus the scope of this study is limited in providing any in depth understanding of the various issues associated with any such transition. Based on this study, the business case of any specific project can be made but with limited focus.

This case while making an attempt to focus the decision makers has resorted to absolutely non-technical way of putting the subject matter for its audience. However, it is very unlikely that all the decision makers for any such transition would be non-technical.
The study has developed few analytical frameworks e.g. for cost benefit analysis and for risk analysis, but the factors to develop the same are not exhaustive. The framework can be made more robust by incorporating project specific factors.

5. Conclusion

In this paper, endeavors to put forward a perspective to the adoption of cloud computing from the business value standpoint. This study is framed to focus the executive decision makers.The focus of this paper is on analysis the investment made on adoption of cloud computing. The analysis covers both financial as well as non-financial benefits and associated costs. The same has been carried out based on a analysis framework. It also highlights the need to carry out a comprehensive risk analysis based on a risk framework taking into account various risks e.g. vendor related, technological, architectural, regulatory etc. The criticality of change management initiative for any such transition is also dealt with.

This has been evaluated from the perspective of arriving at the impact of organizational change. The aspect of opportunity cost and hence ROI associated with the proposed cloud initiative is also highlighted in the study. As part of its analysis, in order to bring in objectivity, the study has proposed framework for cost benefit analysis and risk analysis. Based on the analysis carried out it has provided some recommendations which need to be considered in general while carrying out such transitions. The recommendations are broadly focusing on the need of modification of organizational outlook and need of carrying out a comprehensive cost benefit analysis.

The Need of involvement of all the stakeholders for an effective change management initiative as well as need of a robust communication mechanism has been emphasized. Similarly, the involvement of all the stakeholders in carrying out the comprehensive cost benefit analysis has also come out in the recommendation.At the end, our paper has expressed its limitation in terms of being generic in nature. Though the framework that has been developed can be widely applied, it needs modification to take care of the project specific nuances.

Appendix

I. Financial Cost Benefit Analysis

Particulars	Description	Arguments	Measurements
Benefits			
Cost Saving	Saving in infrastructure cost	Objective and measurable	Difference in direct cost incurred on conventional system and CC
	Saving in manpower cost	Objective and measurable	Direct saving on reduced manpower
Operational Focus	More revenue by virtue of time devoted on core operation rather than on system upkeep	Objective and measurable	Direct value of business done in the time saved
Scalability	Infrastructure deployed during peak and ebb	Objective and measurable	Difference in direct cost incurred
Costs			
Operations	Fee paid to the vendor for upkeep	Objective and measurable	Direct expenses incurred
Downtime	Loss of business due to downtime	Objective and measurable	Value of the business lost (can also be measured based on periodic income generated and the period of downtime)
Knowledge Transfer	Cost of training on new systems	Objective and measurable	Direct expenses incurred

II. Non-Financial Costs & Benefits Analysis

Particulars	Description	Arguments	Measurements
Benefits			
Accessibility	Easy to access (user friendly)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
	Convenient (one stop shop access to various systems)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
	Any time/ any place access	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
	Multiple access points (Mobile, Internet, etc)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
Agility	Quick in response (Plug and play mode)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
Scalability	Demand Capacity match (depending on ebb and rise)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
	Flexibility in architecture level decisions (without fear of wrong scalability and sunk cost)	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
Costs			
Maintenance	Cost offset in terms of time not devoted on core operations	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
Downtime	Uptime SLAs not met	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
	Loss of reputation due to downtime	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new
Knowledge Transfer	Training needs for change in perspective	Intuitive, subjective, context specific	Questionnaire: rating of existing vs. new

III. Risk Analysis

Risk item	Probability (1low – 5 high) and reasoning	Consequence (1low – 5 high) and reasoning	Risk severity (C*P)	Response and costs
Delivery risk (Vendor Capability)	1 – most big vendors are financially robust	4 – should vendor have problems, then operations will be affected	4	SLA, insurance, reference checking – low costs
Benefit Risk (Vendor Unreliability)	1 – most big vendors are financially robust	4 – should vendor have problems, then operations will be affected	4	SLA, insurance, reference checking – low costs
Security Risk (data theft, corruption)	2-Moderate risk of data being hosted outside the company.	5 - confidentiality of data being risked would lead to regulatory as well as reputation issues	10	Check data security of vendor -Moderate cost
Regulatory Risk (Change in Law)	1-Low risk as regulatory changes are not abrupt and are generally not is retrospect	2- Even in case of regulatory changes, the migration time allows mitigation of risk	2	Keep check on regulatory compliances-low cost
Architectural Risks (Compatibility)	1-Low risk as architecture issues are evaluated before migration to cloud	3- Moderate risk if the new applications to be migrated are incompatible.	3	Evaluate compatibility of from future perspective also- Low cost
Technological Risk (Obsolescence)	1-Low risk as obsolescence is never immediate or abrupt	4-should technology gets obsolete, the operations are severely affected.	4	Evaluate technology of from future perspective and be trendy- Low cost

IV. Organizational Impact

Impact Heads	Weightings (W) (cumulative 100) for current business context	Score (S) (0 low – 10 high) for Potential Impact	Weighted score (W*S)
Strategic alignment	30	8- Highly needed for positive organizational impact.	24%
Business Process	10	6- moderately high as redesign of business process may be required	6%
Architecture	10	9- Very high need of integration, scalability and resilience of the hardware and software which the enterprise already has or plans to implement	9%
Direct Payback	10	10- highest as it would be the understood benefits the CC project is expected to deliver	10%
Risk	40	0- Least as exposure of the proposed investment to failure or underachievement is taken care during risk evaluation	0%

V. ROI Analysis

Indicators	Weightings (W) (Cumulative 100)	Score (S) (0 Low -10 high)	Weighted score (W*S)	ROI (A/B)
IT Capacity/Performance				
Storage	**50**	**8**	**40%**	**64%**
CPU Cycles	**25**	**2**	**5%**	
Bandwidth	**25**	**5**	**12.5%**	
Total Weighted Score (A)	**57.5%**			
IT Utilization/Usability				
Uptime	**50**	**9**	**45%**	
Volume of Usage	**50**	**9**	**45%**	
Total Weighted Score (B)	**90%**			

References

[1]. "Beyond the Business Case: Strategic IT Investment," Jeanne Ross and Cynthia M. Beath,October 2001, CISR WP 323, Massachusetts Institute of Technology.
[2]. "Gartner Business Performance Framework v1.0: The Enterprise Reference Model," http://www.gartnerg2.com/wp/wp-0902-0003.asp, Michael Smith, Audrey Apfel and Ken Bergstrom.
[3]. "Investment opportunities as Real Options: Getting Started on the Numbers," Timothy A. Luehrman, Harvard Business Review, July-August 1998, http://harvardbusinessonline.hbsp.harvard.edu/b02/en/common/item_detail.jhtml;jsessionid=02POJXOXD41EECTEQENSELQ?id=98404
[4]. "Managing Business Risk by IT Investment: The Real Options View," Martha Amram, NalinKulatilaka, John C. Henderson.
[5]. '' Express IT project Value in Business Terms Using Gartner TVO Methodology '' 11 January 2006 Michael Smith.
[6]. http://searchcloudcomputing.techtarget.com/definition/Infrastructure-as-a-Service-IaaS search cloud computing
[7]. ways to future-proof your infrastructure by rich freeman Illustration by Keith Negley http://www.f5.com/f5world/articles/volume8/F5World08-future-proof-your-infrastructure.pdf
[8]. Cloud computing: A brief introduction By : David Burford, CFA,MBA,MCB , February 20, 2010
[9]. http://news.cnet.com/8301-13953_3-10052188-80.html Oracle's Ellison nails cloud computing.

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