CLOUD COMPUTING – A CASE STUDY FOR THE NEW IDEAL OF THE IS/IT IMPLEMENTATION

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Abstract:
Purpose: This paper aims to present the conception of cloud computing, its definitions, main service and implementation models. The authors objective is to compare the traditional way of managing and implementing IS/IT in enterprises with the idea of cloud computing. Intent of this work is to juxtapose main economical benefits from adopting cloud solutions and examine its impact on business organisation and market approach. Authors' aim is to indicate conditions influencing the abilities to effective use of potential of IS/IT implementation via cloud computing.

Design/methodology/approach: This article is based on a detailed analysis of business and economical writings concerning cloud computing model. For the purposes of illustrating the effect of implementation the cloud for IS/IT migration authors' used company which hosts large amount of customer data. The research contains comparison of traditional model of managing of IT supply chain and SaaS model in terms of Total Cost of Ownership. After establishing TCO we review financial measures such as: net present value, return on investment, payback and apply it to investments in cloud computing.

Findings: IT implementation is a cost consuming process. Enterprises are permanently seeking methods of reducing costs and ways to improve their business flexibility. Analysis provided in this paper indicates that adopting cloud computing as a method of building IT infrastructure could provide business benefits. Main advantages of cloud computing compared to traditional IT resources management are: reduction of capital expenditure, greater competiveness of small businesses through accessibility to the newest technologies and solutions, shortening time-to-market. Basing on the sample case study results of applied metrics shows that investing in cc solution is beneficial to the company.

Practical implications: This article will give recommendations on decision making in conducting business and distinguishing between the perceived benefits, actual benefits and associated risks of implementing new technologies.

Keywords: Cloud computing, IT implementation, Cost savings, Business agility, Information Technology

1. INTRODUCTION

Organizations trying to meet the challenges of the modern world and its expectations permanently seek effective solutions for operating in competitive environment. Information technology tools and services are indispensable for efficient functioning of enterprises (Geczy & Izumi & Hasida, 2012, p. 57). Significant capabilities from adopting IS/IT attract both: the customers and the providers of this solutions. However, to gain the competitive advantage on market participants have to invest in innovative approach to conducting business. The emergence of the conception commonly known as *cloud computing* represents a fundamental change for information system (IS) and information technology (IT) implementation. The new idea rebuilds the way IT services are deployed, invented, developed, scaled, updated, maintained, and paid for. The main advantages and incentives for adopting cloud-based systems and services are their essential characteristics: on-demand self-service, efficiency, broad network access, rapid elasticity, measured service and business agility.

2. WHAT IS CLOUD COMPUTING ?

Cloud computing is a model enabling convenient, on-demand network access to shared pool of configurable computing resources (e.g., networks, services, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2011, p. 2).

The essential idea behind the cloud-based system model involves IS/IT migration. Organizations could outsource their information technology needs to cloud-based providers (Geczy, et al., 2012, p. 58). Total outsourcing costs should be lower than their information technology investments, hence such action creates savings for the organizations. Cloud computing providers supply services to multiple organizations and exert the economy of the scale. Thus they can offer attractive pricing to the customers and yet maintain reasonable margins.

Depending on the stage of advancement cloud computing service offerings can fall into three broad categories:

1. Software-as-a-Service (*SaaS*): delivers single application through the browser to customers using a multitenant architecture. On the customer side, it means no upfront investment in servers or software licensing. On the provider side, there is just one application to maintain, meaning cost are low compared to conventional hosting.
2. Platform-as-a-Service (*PaaS*): delivers development environments as a service. Customers build their own applications that run on the provider's infrastructure, which are then delivered to users via the Internet from the provider's servers.
3. Infrastructure-as-a-Service (*IaaS*): an organization outsources the hardware used to support operations, including storage, hardware, servers and networking components. The service provider own the equipment and is responsible for housing, operating and maintaining it. The client typically pays on a per-use basis.

Deciding on a particular model of cloud computing, customer at the same time determines sharing of control between them and the service provider over the IT resources used. In traditional model user performs almost total control over held infrastructure and software. In many cases, however, its self-sufficiency is somewhat limited by the dependence of Internet connections providers.

***Table 1**:* Control sharing in cloud computing main services and traditional model

Traditional IT model (on-premise)	Infrastructure-as-a-Service (*IaaS*)	Platform-as-a-Service (*PaaS*)	Software-as-a-Service (*SaaS*)
Data	Data	Data	Data
Applications	Applications	Applications	Applications
Runtime environment	Runtime environment	Runtime environment	Runtime environment
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

under user's control	under common control	under provider's control

Source: Sadowski, 2012, p.6.

In the *IaaS* model, almost all major part of infrastructure (server side, storage of data) is rented out. Data and software remains under the control of the user. In *PaaS* model providers control over used resources is increased. Provider also equips the recipient with operational environment in which user will operate on the self-installed applications. In the *SaaS* model user controls only data. The entire infrastructure and software is under the control of the provider. He also is responsible for their quality and reliability.

Choosing a cloud computing model is de facto choice between the degree of control over resources and the degree of economic efficiency of operation. The company, opting for the full input in the cloud does not bear the cost of purchasing and maintaining an extended IT infrastructure. However, its operational activity is largely dependent on the quality of cloud service provider. For some customers, the migration of almost complete control over their own resources to external IT companies, often becomes a difficult condition to accept. Prospective customers can choose among main deployment models of cloud computing:

1. Private cloud:
The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises. Services are accessible within the organization via intranet. This solution is the safest, but also the most expensive one. IT resources and services requires increased initial cost due to financial allocation in its deployment, maintenance and management. (Geczy, et al., 2012, p. 60).

2. Community cloud:
The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises. It may be, for example, a separate company in the capital group engaged in the provision of ICT services.

3. Public cloud:
The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider. (Mell & Grance, 2011, p. 3).

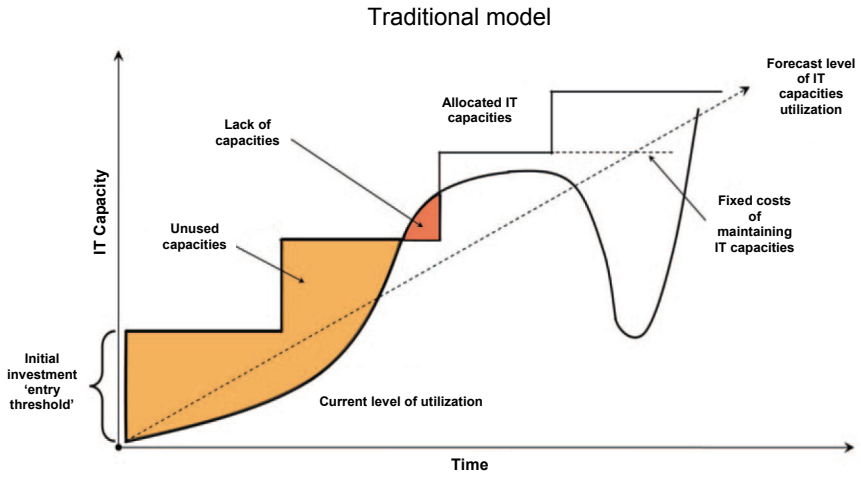
4. Hybrid cloud:
The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability(e.g., cloud bursting for load balancing between clouds). (Mell & Grance, 2011, p. 3).

Choice of deployment model is largely dictated by the technical and financial opportunities and risk appetite. For example, if a organization already has ITC equipment (e.g. servers, matrices), which disposal is at a low level, it can consider building own "Cloud" and management of internal risk control. If customer does not have ICT equipment, but has financial ability to purchase it (and purchasing competence to use it) this option is also possible. On the other hand if the client does not have the equipment or funding sources and is in state willing to start rely on cloud supplier potentially the best solution is a public model.

3. COMPARISON OF TRADICTIONAL MODEL WITH CLOUD COMPUTING MODEL

In the traditional model, the enterprise, that chooses to operate on own IT infrastructure, at the beginning of its operation is forced to bear the cost of purchasing servers, network infrastructure, software etc. Provided by this equipment capacity (disk space, processing power) for a certain period of time may not be fully used (for example, the initial phase of the project starting a new business service). User will incur throughout this period the cost of the equipment maintenance (power, cooling, etc.).

Picture 1: IT capacity in traditional model



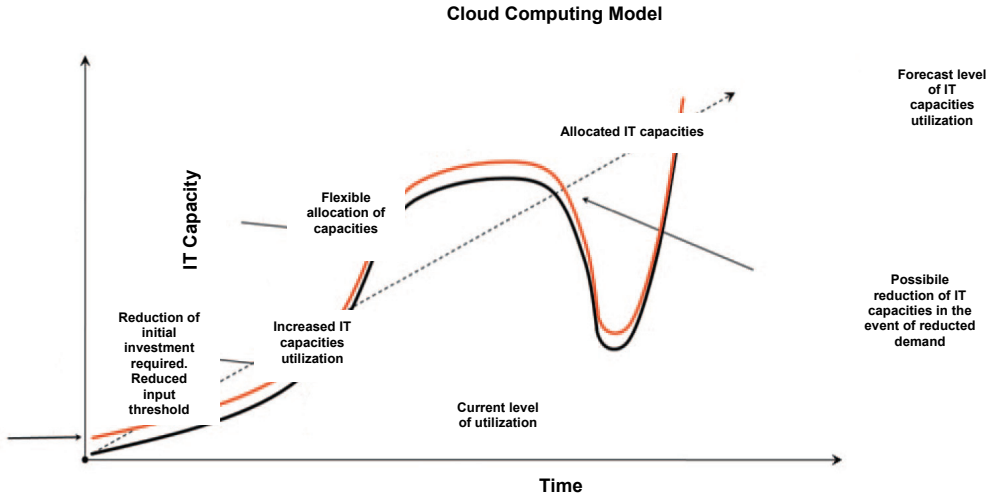
Source: Sadowski, 2012, p. 8.

In the next period further development of the company can force user's need to invest in additional infrastructure. It may occur also that the company's development will be faster than expected, and available IT resources even after increasing their potential won't be sufficient to ensure undertaking an appropriate level of IT activity. Insufficiency of IT infrastructure exposes the company to lose additional demand for products or services. The company has lower income and probably will record deterioration in financial performance. Observing the increasing demand for It resources company once again bear the necessary investment. The response of company could be little late, which may adversely affect its public image. With regard to the periodicity which occurs on market, it can be assumed that after a certain period of time the level of demand for the company's product will decrease to the level before the fast growth. The potential of the installed infrastructure will be largely untapped, while the operating costs associated with IT resources maintenance remain essentially unchanged at a relatively high level.

Business practice shows that the companies, which are capable of adapting to changing conditions in short-time, will always be in a better position than its competitors. Inability to adjust the rapid growth in demand, (skill to handle in a short time increased number of customers), usually results in their loss. Contractors move to the companies that can meet their needs, and for the enterprise is usually means deterioration of its market position. Firms basing its operations on the model of the traditional use of IT resources may find themselves in the situation described above.

One of the solutions reducing the negative effects of described change is to asset IT management the cloud computing model. Companies which migrate their IT resources to clouds after a short time begins to achieve measurable economic benefits First of all, starting market activity, company is not forced to invest in the development of infrastructure, thereby generating savings. Borne initial costs returns very quickly, in contrast to the traditional model where the investment returns normally at a much later period. Then, with the increase of IT resources maintenance, there is no the need to invest in additional servers and software. The cloud provider offers to the recipient high scalability combined with the possibility of a flexible allocation of resources, when in fact there is a demand for it. This prevents the situation that may take place in the traditional model when own IT resources are unable to meet sudden unexpected surges of demand.

Picture 2: IT capacity in cloud computing model



Source: Sadowski, 2012, p. 9.

Implementation of cloud computing services reduces therefore the risk of losing additional revenues and loss of customers. Flexibility in responding for customer needs can therefore be competitive advantage.

4. ECONOMICS OF CLOUD COMPUTING

Economic incentives are among the main reasons for organizations to migrate from traditional IT architecture to cloud computing Economically, the main appeal of cloud computing is that customers only use what they need, and pay for what they actually use.(Adekunle, et al., 2012, p. 4).

It is not unusual for many companies to bear permanently increasing costs of IT infrastructure. Building own and self-developed IT infrastructure is a expensive and time-consuming process, thereby limiting operational potential of companies.

In standard conditions when there is a necessity to provide some kind of IT solution its total cost consists of three major factors: the cost of IT equipment (servers, storage), the cost of the software (licenses) and all kinds of costs of integration, support and maintenance (for both hardware and software). These costs are borne entirely by the unit implementing IT solution, which sometimes creates a problem to obtain appropriate financing. For single company such purchases forces bearing in a relatively short period of time a large financial outflow, which means that the appropriate financial resources must be previously accumulated. In addition, such an obligation may have a negative effect in the context of the financial liquidity of the unit. The application of cloud computing model allows to avoid these problems. Since the main idea of cloud computing is paying in accordance with the actual use, it causes complete disappearance of need to incur high initial financial outflow. Using IT resources in cloud model is qualified as an *operating expenditures* (*OpEx*). In turn, expanses on IT infrastructure are *capital expenditures (CapEx)*. Converting *CapEX* to *OpEx* via cloud computing model enables to achieve two main economic benefits:

- Absence of up-front capital expanse allows capital to be redirected to core business investment. Expenses on fixed assets decreases basis of taxation only through depreciation, which may, depending on the assumed rate of depreciation be deducted by several accounting periods acting additional burden of future budgets. In turn, expenditure on external IT services is the cost of current activities of the company and are fully taken into account in the determination of financial statements. This way of obtaining recourses can be used for other type of investment.
- the lack of incurred *CapEx* means that the total balance sheet does not increase so that there will be no decrease in the return on assets (*ROA*). This ratio is often used in economic and financial analyzes thus companies' management may depend on its high value.

Another economic issue worth discussion while considering implementation of cloud computing is opportunity cost combined with Pareto principle. Gartner estimates that IT maintenance accounts for around 80% of total IT expenditure. The opportunity cost of not choosing the cloud is therefore the benefit that can accrue to the organization through optimal utilization of that 80% (Kepes, 2011, p. 2). Conception of cloud-based technology can generate ideal distribution of time and resources where majority (80%) of business value is concentrated with running applications themselves and minority (20%) accrue to core technology, servers, operating system, data centre, etc. Thus moving to cloud computing can make difference between an organization being 20% efficient and one being 80% efficient.

5. CLOUD COMPUTING SERVICES: A TOTAL COST OF OWNERSHIP APPROACH

Total cost of ownership (TCO) is a financial estimate which purpose is to help consumers and enterprise managers determine direct and indirect costs of a product or system(Wikipedia). It includes the total cost of acquisition, installation, operation, maintenance, and finally disposal of the assets of the company over a given period of time.

In the IT industry, Total Cost of Ownership is used for evaluation of current and projected spending on IT infrastructure and telecommunications. Model takes into account the direct costs disclosed in the budget and payroll, as well as indirect costs - defined as the costs associated with the actions of the users and downtime. The most important component of the model is - in addition to the cost of the classification system which includes a rich list of categories - the basis of statistical data on the cost of computing for many industries.
The TCO calculation model includes the following categories and components:

1. Evaluation and Selection
   - Solution evaluation & analysis
   - Vendor review and SLA analysis (as applicable)
2. IT Infrastructure hardware, software and support
   - Server and storage hardware and maintenance
   - Operating system, database, security, backup software and maintenance.
   - Administrative IT costs for systems and database
3. Application subscription costs OR application license costs
   - ERM and CRM application subscription or license cost
   - Application maintenance
4. Application solution deployment costs
   - Detailed design
   - Configuration and deployment
5. Initial and ongoing training costs
   - User training
   - Administrative training

To present the application of TCO model we introduce an example case study that deals with the provisioning of a public SaaS cloud computing service. In this sample case study the recipient of cloud services is fasion retailer with 12 stores spread across New Zeland. They previously hosted their own server infrastructure internally to provide the retail platform and point-of-sale for all their stores which required a private network, creating problems keeping all 12 stores I sync.(Keper, 2011, p. 8). Company decided to migrate their platform to cloud solution and moved points-of-sale to an online application backend entirely by cloud provider, thus gaining cost saving and no necessity of IT infrastructure management to retail business owners.

Before implementing cloud computing company's IT budget was $30K per annum(excluding hardware) which included:

- server maintenance of their hosted retail platform
- IT support for each store point-of-service
- IT support of the Head Office infrastructure and network
- Remote backup services

The company decided to host a number of business activities with the use of cloud services. To manage email, calendar and contacts services used Google Apps. Circulation and sharing documents

was provided by Dropbox. Accounting entrusted to Xero. All sales platform, including back office, distribution centre and production is supported by the platform offered by the Vend.

From an economic point of view gained benefits are impressive. Requirements concerning IT infrastructure are now much simpler an easier to manage. Operating the entire adoption took only a few weeks with minimum consultation expanses.

The decision to implement a new IT management system is a strategic move for company so taking investment risk in account is necessary. Despite the undeniable benefits of the cloud computing, model should be compared with the existing variant. Such investments are selected on the basis of economic efficiency calculation. There are many indicators that quantify the relative cost-effectiveness of projects like *Return on Investment (ROI), Payback Period (PP), Net Present Value (NPV*).

Reliable calculation and correct interpretation of results should precede any investment decision. The TCO calculations take into account a combination of factors (which are erroneously omitted) such as the cost of acquiring and maintaining adequate human competence in the field of IT and the cost of implementing and operating security mechanisms. Disregarding all the determinants of cost and lack of risk analysis can lead to biased result and ultimately to choose a sub-optimal solution. Note that the cloud computing model is not always the most effective solution. Each case must be considered individually. Successful implementation of this model depends on several factors such as for example: the size of the company and readiness to implement a completely new management model. The key issue is also to reduce operational risk. Deciding on cloud business model is to a large extend moving from internal management of own IT infrastructure to third-party management of external companies. Ensuring quality and safety of provided services is crucial. Migrating IS/IT system to cloud model requires precise terms of the contract with provider. Contract terms should be de described in Service Level Agreements (SLA), because in cloud computing model customers give up some control to the vendor.

6. BUSINESS AGILITY VIA CLOUD COMPUTING

Business agility is the ability of a business to adapt rapidly and cost-efficiently in response to changes in the business environment. Agility is a concept that incorporates the ideas of flexibility, balance, adaptability, and coordination. By agile approach company can implement complex projects in a short time, focusing on the relevant value for user. Many companies today focus on cost controls and how operational expense can be reduced with cloud. However, the most forward-thinking organizations are demonstrating today that business agility is actually the greatest cloud benefit. (Reaping the Benefits of Business Agility with Cloud Computing: Real-World Profiles, 2012, p.1). Business agility is one of the main reasons why enterprises are pursuing private clouds. Cloud computing method of storing information allows users to share and scale IT resources across workloads and user groups what helps improve performance and availability of information. By enabling a self-service based system, cloud computing reduces IT operational costs and improves business performance. Self-service provisioning, automation, and workload mobility management are all results of cloud computing.

7. CONCLUSIONS

As demonstrated throughout this paper cloud computing idea of IS/IT implementation has numerous benefits. Model is viable alternative to existing traditional management scheme of IT investments. It seems that every company before deciding to change the management model IT resources from traditional to cloud computing, you should conduct a thorough analysis of the "pros and cons" of such a solution. Migration of IT resources to the cloud computing means increased economic efficiency of, but also relinquishing part of control outside vendors. Less control over resources is usually greater economic benefits and vice versa. It is therefore important to make proper balance between the two criteria. The migration of IT resources to the cloud-based technology should be widely investigated and based on risk analysis.

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