

# Cloud Computing: A Strategy to Improve the Economy of Islamic Societies

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**ABSTRACT** : Cloud computing is the new technology that significantly change the landscape of businesses as it enables users, companies, and governments to store information in multiple servers and allows on-demand access. The cloud computing plays a strategic role for all businesses whether technological oriented business or services industries because it helps in eliminating most of IT constraints that consist of limited resources, consuming maintenance, and incompatible system, as well as enables the businesses to pursue growth and innovation. The aim of this paper is to discuss the ways to which Islamic societies can adopt cloud computing to reap it the benefits. Literature review on cloud services as well as its adoption strategy, approaches, and implication are discussed in this paper.

**Keywords:** Economy Improvement, Adoption Strategy, Cloud Computing, Islamic Countries

## 1. Introduction

Cloud computing is one of the modern technologies that significantly affect business as it enables users, companies, and governments to store information in multiple servers and allows on-demand access. Cloud computing plays a strategic role for all businesses whether technological oriented business or services industries because it helps in eliminating most of IT constraints that consist of limited resources, consuming maintenance, and incompatible system, and cloud computing frees the business to pursue growth and innovation [1]. Furthermore, Cloud computing is a strategy that is concern with business agility to enable businesses to migrate increasingly of their internal technology to cloud based services. As the model of the cloud computing is undeniable, a cloud computing approaches can enable the businesses to realize the potential to improve flexibility, scalability and cost management that will transform the entire business environment — people, processes, and systems. If the cloud computing is implemented and executed well, this will give a way for business to optimized

processes, save cost, and enhanced controls for the users of cloud computing [2]. Therefore, adoption and integration of cloud computing infrastructures and services to the economic landscape of Islamic societies will have a tremendous effect on the well-being of the Muslim communities as it help them to move some of Information technology infrastructures to cloud services for a cost effectiveness. This study focuses on the examination of benefits of the cloud computing and how it can boost the economy of Islamic societies. Literature review will be the basis to discuss issues and draw conclusion.

## 2. Cloud Computing Definitions

Literature presents various Cloud Computing definitions. The definitions come from a wide range of viewpoints with diverse degrees of explanations. Gartner’s definition of cloud reveals it as elasticity, scalability, and delivery as service [3]. Forrester’s definition shows that cloud is the scalability, abstraction, hosting, and billing model [4]. IDC sees Cloud Computing to be an emerging IT model, and talks about real time delivery over the Internet [5]. ACM distinguishes between private and public clouds, and put forward the view that cloud is data center hardware and software [6]. The NIST defines cloud computing as “a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” [7].).

### 2.1 Cloud Implementation Option

Cloud computing services can be implemented either as a Private Cloud, Public Cloud, or Hybrid situation. The suitable approach to implement cloud services depend on specific nature of each organization, including factors such as overall goals, economic pressures, and risk profiles [8].

**1. Private Cloud:** This is a cloud service model dedicated for a specific implementation by

organizations, and the datacenter may be located at the premises of the organization. The private cloud computing services do not depend on external environments, which give full autonomy and control over security, data management, and auditing to organizations. Some drawback of private clouds can be too expensive cost, and larger systems (data centers), to develop [8].

**2. Public Cloud:** The public cloud services are available to the general public or enterprise and they are owned by a vendor selling cloud services. The idea behind it is to shared resources require minimal IT investments and reduce enduring operating costs over the long term via on-demand or pay only for what you use. On top, the public cloud facilities are readily accessible to balance resources with usage requirements. By public cloud, many observation of a loss of some control may be experienced at initial but it do offer greater flexibility for data access and storage along with greater security — including robust disaster recovery services [8].

**3. Hybrid Cloud:** The composition of two or more independent clouds (internal, community, or public) that are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds) [7]. These cloud services are designed to offer the cost and flexibility advantages of the public cloud with the on-site control of a private cloud.

## **2.2 Cloud computing solution**

Cloud storage and solution services include Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS)

**1. Software as a Service (SaaS):** SaaS is based on cloud architectures and platforms that provides and delivers value through cloud-based solutions to clients. This means the provider licenses an application for use as a service on demand to the customers but vendor have to provide, manages and controls the underlying cloud infrastructure, including individual applications, network, storage, servers, operating systems, etc. The customer is allows to fully access the vendor's applications in the cloud via a variety of devices (e.g. cell phone, laptop, PDA). SaaS examples include MyErp.com, Salesforce.com and Workday.com. Google Docs, Twitter and Facebook also fall into this category [9].

**2. Infrastructure as a Service (IaaS):** IaaS is planned to function as a well-organized compute utility. The vendor provides, manages and controls the general cloud infrastructure but provides the customer control over operating systems, storage, processing, and networks on demand. IaaS vendor examples include Amazon's Elastic Cloud Compute (EC2) and their Simple Storage Service (S3) [9].

**3. Platform as a Service (PaaS):** PaaS extends basic Infrastructure-as-a-Service with added support for core operating systems and applications, including software development and testing tools (if desired) [8].

## **3. The Implementation Of Cloud Computing Across The Globe**

Cloud computing allows storage of information in servers that are accessible by Internet-based technology provided as a service and on-demand to clients. The impact of the diffusion of the cloud computing is very important in today's society by merely considering the diffusion of telecommunications infrastructures in the 70s and 80s. The crucial consequences of this diffusion will be on business creation and macroeconomic performance, job creation in all industries and job reallocation in the ICT sector, and public finance accounts, through the direct impact on the public sector spending and the indirect one on the tax revenues [10]. As a result, several studies of cloud computing adoption by government across the globe are available.

A study was conducted on the diffusion of cloud computing to European's Small- Medium Enterprises (SMEs) and concluded that cloud computing are going to be positively related to the speed of adoption of the new technology as it can "create a few hundred thousand new European SMEs with a substantial impact on employment and a reduction of the unemployment rate of a few decimal point [10]. Furthermore, study indicated that Countries in Asia pacific are in different stages of forming a cloud strategy and implementing it [11]. According to the authors, the Governments in Asia pacific want to enhance their own ICT infrastructure and reduce ICT spending through cloud services as they "believe that by establishing a cloud computing ecosystem within the country, they will be able to generate more business opportunities and even create export opportunities

for these services. Furthermore, the governments are looking to promote acceptance of these services across multiple verticals” [11]. The Countries in Asia that envisage the benefits of cloud computing include: China by Leveraging cloud computing to transform City of Dongying from a manufacturing-based economy to a high-tech services oriented economy, Japan to tap Government potential through the Kasumigaseki Cloud, South Korea’s Communication Commission has allocated about \$500 million for the development of Korean Cloud Computing (KCC) facilities, Singapore Government is promoting cloud computing through Subsidies, the Taiwanese Government is invested significantly in cloud services, the Thai Government has started to test-out cloud services for Long-term use, Vietnam Government has collaborated with IBM and educational universities to promote greater adoption of cloud-based services by public and private sectors while Malaysian Government has created the right environment to push cloud services by joining the open source cloud computing test bed called Open Cirrus, created by HP, Intel, and Yahoo [11].

As cloud computing has started receiving a broad adoption in the public sector across the world, the United States is a leading country that move to a “Cloud First” strategy. The country makes it the first Government-wide system to move into the Cloud in April 2010, which started from the use of Google Mail and Google Documents to the migration of Recovery.com. Furthermore, the U.S. Federal Budget for 2011 has integrated cloud computing as a strategy to achieve efficiency and reduce costs. It affirms that all agencies should assess cloud computing options as part of their budget submissions for all major IT investments, where relevant [11]. A typical example of one the U.S. agencies is General Services Administration (GSA) that established a portal dedicated to cloud computing applications for the public sector. The Cloud-based solution adopted by GSA has helped in reducing the site upgrade time from nine months (including procurement) to a maximum of one day. Likewise, the downtime has been reduced drastically to 99.9% availability from about two hours earlier with the traditional hosting setup [12]. In terms of costs, GSA used to pay US\$2.35 million annually for USA.gov, in the legacy system. This included hardware refresh and software relicensing costs of US\$2 million and

personnel costs of US\$350,000. By moving to a cloud service, GSA now pays an annual total of US\$650,000 for USA.gov and all associated costs, a cost saving of US\$1.7 million, or 72% [12].

In other developing world where the electrical grid is unreliable at best, a combination of cheap, battery-powered Smartphone and inexpensive cloud computing servers based in the United States or Europe allow businesses to circumvent the electrical grid all together [13]. For instance, Cheki, a service that classifies an African used car, boasts a million users and over a billion page views each month. Cheki has quickly established a huge market that covers Kenya, Nigeria, Malawi, Rwanda and Ethiopia, with most people accessing the site with Android-based smartphones that cost about \$70 [14].

#### **4. The Steps In Adopting Cloud Computing**

Cloud computing adoption in public service require an intensive policy making decision by the government of nations. The simple reason is the complexity nature of the cloud computing, which comprise of privacy interoperability issues, systemic risk, jurisdictional complexity, data governance, reliability, loss of IT control, etc [10]. Therefore, the policymakers in countries should promote the adoption of cloud computing through effective cloud strategy that may include:

1. **Create Cloud Adoption Team:** The team is saddled with responsibility of strategic planning to adopt the cloud across the entire sectors of that country. The CEO or President lead the cloud adoption team while the rest of the team should be comprised of cross functional leaders including finance, marketing, sales, legal, IT, operations and the various lines of business [15].
2. **Define the Goals of Cloud Adoption Strategy:** identify the objectives and develop cloud strategy through the business case as well as develop the framework for cloud governance model [15].
3. **Establish Cloud Services Governance:** Issues to consider will begin with who can make the decision on adding cloud services and how will it be funded. It should also address how IT resources are

allocated and scheduled. Changes in IT governance may also be needed to address who will be responsible for managing the cloud service provider and how cloud services be managed and controlled [15].

4. **Updates Policies and Procedures:** revise policies and procedures that will need to be amended to reflect implementing cloud computing solutions and establish a minimum set of technological standards and process standards to be respected in the provision of cloud computing services to guarantee data security, privacy and portability, and promote a healthy diffusion of the cloud computing [15] and [10].
5. **Plan for the Cultural Changes:** A successful cloud computing adoption strategy must account for the cultural change that will be required to embrace cloud services. Remember, cloud computing doesn't simply represent a technology change [15].
6. **Provide motivation:** introduction of fiscal incentives for the adoption of cloud computing and a specific promotion in particular dynamic sectors (for instance, governments could finance, up to a limit, the variable costs of computing for all the domestic and foreign firms that decide to adopt a cloud computing solution [10].

## 5. Strategy Approach For Adopting Cloud Computing In Islamic Society

As cloud computing assures the reduction to overall IT operating costs through increasing infrastructure utilization, this will significantly improve business agility as well as economy of Islamic country. Because of the reduction in IT expenditure, the countries can align business lines to cost with value received.

However, the cloud strategy to be adopted by Islamic countries to reap the benefits of this new emerging technology can be explained in two phases – policy and approach.

### 5.1 Phase one: policy

The countries should focus on the policy that governs the resources of cloud computing such as infrastructure, platforms, and services to support

for a digital information transaction among them involving the exchange, storage, processing, and effective administration of data. The main aim of focusing on strategic policy decision is to enable the Islamic countries host commercial data in a cloud environment among themselves. For instance, European Data Protection Directive 1995 or The APEC Privacy Framework 2004 were regulating personal data processing at international levels for any transfer of data to countries outside European communities that does not provide “an adequate” level of protection is prohibited [16].

The policy needs to outline both the benefits and risks of adoption of cloud computing that may involves information in the portal, cost of hosting, and protection (security) requirements, and then lay down a roadmap for the initiatives development of adoption of cloud services. To this point, Malaysia, Turkey, and Indonesia are the Islamic countries that introduce strong measures for protecting the digital economy and cloud computing. In recent world ranking for the massive and well-documented movement to cloud services by consumers, businesses, and governments conducted this year, Malaysia was ranked 13th, Turkey ranked 18th, and Indonesia ranked 21st respectively out of total number of 24 countries [17].

### 5.2 Phase two: approach

The strategic approach to cloud computing in Islamic countries should be both private and public cloud services. The reason is that each of them has its own values and capabilities to the economy. On one side, a public cloud delivers services to wider geographical areas that span across continents. On the other side, a private cloud delivers better performance and integration with non-cloud data center services that public cloud cannot match. To achieve this, the countries need to leverage both but not necessarily adopting them at the same time. According to Alvarez, Staten, & McKee (2012), “cloud strategy requires both private and public cloud services” and ‘operational maturity is needed for cloud success’ [18].

## 6. Implications Of Cloud Computing In Islamic Countries

The motive behind cloud computing is to provide on-demand accessibility of computing resources, reduction of capital investment in IT infrastructure and info-structure as upfront cost, facilitating

speedy upgrade and scale-down capacity of hardware and software equipment to make better IT agility, allowing organizations to focus on their core businesses and strategic goals instead of keeping IT infrastructure and the data center running, and above all easing the use of IT resources. With all these capabilities of cloud computing, the Islamic countries can drive a start up to innovative economic services that scale in the following categories.

### **6.1 Economies of scale**

The Cloud computing takes IT infrastructures and service into large data centers, which produces economies of scale for the Supply Side savings, Demand side aggregations, and Multi tenancy efficiency [19]. The economies of scale can bring down the unit per cost of consumed IT service because it reduces cost of electricity consumption, lower Infrastructural labor cost of distribution, and provides reliability in the event of disaster.

### **6.2 High scalability of IT investment**

The cloud provides on-demand access to shared resources that reduced upfront cost of IT investments through turning the fixed capital expenditure in IT into operative costs depending based upon size of demand. This contributes to the reduction of the difficulties for SMEs to own infrastructure as with cloud computing they do not need to purchase expensive IT infrastructure (hardware and Software) to support their business. To this end, the implication that the cloud will have on the economics of Islamic countries is tremendous by creating new chances for new businesses (SMEs) as well as Job opportunity.

### **6.3 Minimize management cost**

The cloud computing provides easy tools for integrating legacy IT infrastructure with the new IT application, infrastructure and platform that eliminates the complexities of managing IT cost and with ideally no IT personal required. In long run, this will also lower operational and maintenance cost since the computing resources comprising of servers, databases, applications, middleware platforms, licensing renewal and updating all lies in the cloud and nothing substantial is present in premises except smart

terminals, operational and maintenance costs will be reduced to zero [19].

### **6.4 Opportunities for employment and economic recovery**

The pay-as-you-go subscriptions, storage, and/or IT management functions provided by cloud computing can allow small firms to scale up or down to meet the demand, which provides more chance for creation of new SMEs and of employment. On the other hand, In the event of natural disaster or global crisis, this could be an important contribution to promote the recovery and to foster growth [19]

## **7. Conclusion**

The economic situation of today's businesses depends on the efficient utilization of IT resources to which are very costly especially for the SMEs and developing countries. However, the cloud services promises to provide a possible techno-economic solution to reduce the increasing expenditures of IT infrastructure through providing an alternative ways that maximizes the deployment and utilization of computing resources for organizations and governments across the globe. The shared of pool computing resources enable Small and large businesses to leverage economies of scale, have high scalability of IT investments, minimize management cost, and opportunities for employment and economic recovery. Nevertheless, the benefits of cloud computing requires an adoption strategy, which is not an easy process because it do require intensive policy, security, and legal compliance to be clearly understood and addressed.

Therefore, this paper discussed on the ways the Islamic societies can adopt the cloud computing to enhance their economic well-being to serve their citizens. The strategic adoption was explained in two phases – Policy and Approach. The policy needs to outline both the benefits and risks of adoption of cloud computing that may involves information in the portal, cost of hosting, and protection (security) requirements, and then lay down a roadmap for the initiatives development of adoption of cloud services. The strategic approach to cloud computing in Islamic countries should be both private and public cloud services. The reason is that each of them has its own values and

capabilities to the economy. On one side, a public cloud delivers services to wider geographical areas that span across continents. On the other side, a private cloud delivers better performance and integration with non-cloud data center services that public cloud cannot match. With these, we believe that the countries can reap up the benefits offer by the Cloud computing.

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