Cloud Computing Applications and Information Services: Reflections from Turkey

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Summary: *Nowadays library and information profession is facing increasing pressures to achieve higher performance in a fast paced and competitive global environment. Today services provided by libraries are based on the newest, cutting edge technology and professional organizations have a major role to play in this developmental process. Recent developments in digital technology, wireless communication, knowledge management, outsourcing and the like are affecting the knowledge and skills of information professionals to do their job effectively on a daily or long-term basis. In that context, information professionals focus on studies such as digitization of print materials, metadata standards, property rights, preservation, the development of network infrastructure, storage solutions, cloud information management, multi-media technologies, automation and standardization, institutional repositories, development of cooperation frameworks, e-publishing and web content management. As part of these developments, information systems and applications are increasingly driven by cloud computing opportunities. In this framework, our study is focus on current cloud computing implementations in general and in information disciplines. In addition this study represents the potential benefits and risks of cloud applications with the example of international and locally in Turkey. In general cloud computing is directly related to the information systems because it is based on processing of information, management of system, and repository of information. Moreover future trends of Information systems are seen in cloud applications may create new dimensions to information disciplines. Furthermore cloud applications may not directly relate with information systems is also part of this study because of the nature of cloud applications.*

Keywords: Cloud computing, information management, Turkey.

Cloud Computing: General Definitions and Concepts

Cloud computing in information technology-oriented studies is gradually increased. According to the information of International Data Corporation (IDC, cloud computing industry in Europe may be 110 million euros and 6 million euros in Turkey (T.C. Kalkınma Bakanlığı, 2012, p. 8). Also the expenditure of cloud computing is expected more than 45 billion dollars in the World (Paquette, Jaeger and Wilson, 2010). The earnings of cloud computing will be reach 170 billion in 2015 and the sector growth in Turkey is expecting %54 (Doğan, 2012). National Institute of Standards and Technology, Information Technology Laboratory defines cloud computing as a model for enabling ubiquitous, 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. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models (Mell and Grance, 2011, p. 2). Varieties of cloud technologies depend on their application can be reachable now as the follows: Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS) and Cloud Infrastructure as a Service (IaaS) (Piotrowski, 2013, p. 192). Main problems that cloud computing brings about are summarized as follows**:**

- Web-based cloud services are designed to operate on broad-band Internet. Therefore, downloading and uploading speed of Internet connection are considerably important for using cloud services. 43.2% of the residences have broad-band Internet access in Turkey (Türkiye İstatistik Kurumu [TÜİK], 2012).

- There are also risks regarding protecting the privacy of user passwords and personal information at locations where users can have connection without even using a password (such as cafe, restaurant, bus etc.).
- Details on the location of data are among important issues and should be covered by the agreement to be signed by the user for the settlement of the legal problems in numerous countries including Turkey (Microsoft, 2012).
- Turkey does not have a binding regulation with regard to standards to be met in order to provide cloud computing service.
- There may be interruptions in the services of large-scaled companies including major cloud service providers such as Microsoft, Google, Yahoo, BlackBerry and Amazon (Perlin, 2012).

It is stated in certain terms of services that service provider may use, change, adapt, record, recreate, distribute and monitor the content with the aim of improving its service quality (see Google Terms of Service or Microsoft Online Privacy Statement).

Cloud Computing in Library and Information Centers

One of the important steps for integrating cloud application for library and information centers is to start massively aggregating data about their collections into common pools, OCLC's WorldCat, the first example of this, is now forty years old and pre-dates both the Web and cloud computing. On the other hand The Hathi trust is building a repository of digitized books and journals from major research libraries in the United States. OAISTER is a service started by the University of Michigan and now managed by OCLC which seeks to harvest all the major digital repositories around the world. Europeana is gathering the digitized collections from Europe's galleries, libraries, archives and museums. What makes these aggregations and others like them important is their intent to allow their content to be mashed up into other services and re-used. Other benefits growing from massively aggregated data about collections is the ability to aggregate user opinion and use. LibraryThing is a good example of being able to build recommender services based on the aggregation of what thousands of people hold in their personal libraries Cloud applications help to easily manage diverse collections by acquisition to description and sharing to retrieval (Goldner, 2010). The library community can apply the concept of cloud computing to amplify the power of cooperation and to build a significant, unified presence on the Web. This approach to computing can help libraries save time and money while simplifying workflows. A brief list of potential areas of improvement could include:

- Most library computer systems are built on pre-Web technology Systems distributed across the Net using pre-Web technology are harder and more costly to integrate.
- Libraries store and maintain much of the same data hundreds and thousands of times. With library data scatter across distributed systems the library's Web presence is weakened.
- With libraries running independent systems collaboration between libraries is made difficult and expensive.
- Information seekers work in common Web environments and distributed systems make it difficult to get the library into their workflow
- Many systems are only used to 10% of their capacity. Combining systems into a cloud environment reduces the carbon footprints, making libraries greener.

These improvements can be grouped into three basic areas: technology, data and community. Each offers some general and some unique opportunities for libraries (Sudhir ve Das, 2013).

Cloud Infrastructure of Turkey: Information and Communication Technologies

Turkey's Information and Communication Technologies (ICT) market is anticipated to surpass slightly more than US$ 26 billion in 2010, up from the US$ 24.6 billion for 2009 which was nearly 4% of GNP in 2009. The share of information technologies in this market is around US$ 7 billion while that the communication technologies US$ 17.5 billion. Turkish ICT sector is expected to show an increase of 6.5% in the year 2010 compared to the previous year. The Turkish ICT market has experienced significant growth over the past years. Turkish ICT sector is promising in 2010 and in future because of the some positive developments as follows:

- Telecommunication markets have been open to new entrants since January 2004.
- The privatization of Turkish Telecommunication Inc. was completed.
- The process of harmonization with the European Union and EU accession negotiations has been started on October 3, 2005.
- IT expenses are being increased at a remarkable rate in the economy.
- Government support for R&D activities.
- E-transformation project that is on the way within the EU harmonization process.
- Young, dynamic market in terms of mobile services, Internet penetration, computer ownership, etc.
- Electronic signature law has enacted at the beginning of 2004 that fostered the use of the on-line services in both government and the private sector.
- A tax holiday incentive based in techno-parks established to boost companies R&D activities and innovation capabilities.
- A law, named "Research and Development Law-Law No: 5746", came into effect as of April 1, 2008. The law brings several advantages and aims to boost local R&D. Besides, it aims to attract R&D sections of global corporations to the Turkey (Export Promotion Center of Turkey, 2010).

Strengths, Weaknesses, Opportunities, Threats on ICT and Applications in Turkey

According to the research result of Business Software Alliance (BSA) on most effective countries at the cloud IT applications in 24 countries, Turkey selected 17th county with 52,1 score, ahead of countries like South Africa, Indian, China. These 24 countries within the investigation were selected by IT market size around the world. In addition these countries constitute %80 of total market of IT market. On the other hand same investigation clarify that Turkey has some fundamental problem on protecting the individual data and data privacy in electronic environment and on cloud. While North Korea, Canada, Japan got 8 out of 10 Turkey got only 3,5 point in that area (Business Software Alliance). Main reason shown as the reason of this low score is lack of legal regulation on protection of individual data and data privacy although Turkey signed the agreements of EU regulations on it (Business Software Alliance, 2012). Turkey has to be take following steps for completing infrastructural issues on IT and cloud applications according the authorities:

1. Turkey has some fundamental gaps on apply applying sober laws especially practicing of data protections regulation.
2. Turkish citizens have Constitutional rights for protecting individual data. But the lack of other complementary regulations is creating problems in practice. If Turkey can develop the regulations proper to international examples these problems can solved rapidly

3. One of the anxieties of data protection especially in the banking and telecommunication sectors is some mandatory regulations introduce that data should be keep in national zone. These regulations are limiting the use of cloud applications.
4. The regulations that identify the Internet use in Turkey for example 5651 is mentioned that not compatible with international examples especially on freedom of speech
5. The followings problems were declared that the investigation against Internet crimes are not carried out effectively, in many cases, criminals can not be determined, evidence could not be collected accurately and effectively, investigation and prosecution stages take in very long time.
6. Turkey signed the Convention on Cybercrimes but most of the important substance has not been implemented so far, intellectual property protection is up to date, although reasonable in Turkey irregularities in practice are expressed.
7. Against online copyright violations, regulations in Turkey are seem effective for enabling the removal of infringing content where a specific provision. It is accepted that Turkey has taken some important steps for integrating with EU and international society while Turkey has no policy on governmental tender specification of IT (Bussiness Software Alliance, 2012).

Some Cloud Examples of the Governmental Organizations in Turkey

Turkey has some flexibility for the applications of cloud especially if compare with EU countries which they have so strict regulations to use cloud especially for some agencies given cloud services outside EU zone. Furthermore a lot of private and public organization use cloud services without any restriction that also create some dangerous conditions also because of lack of legal regulations. Turkey has some national wide IT applications such as MERNİS (Central Population Registration System), UYAP (National Judiciary Informatics System), SAY2000i (Web Based Accounting Automation System), EKAP (The Platform on Electronic Public Procurements). Ministry of Family and Social Policies Deputy changed the server infrastructure to thin client is one of the first cloud application in Turkey. Many applications are centralized by 5 different main servers in the directorates has been unified and services realized with 320 virtual servers. Whereby %87 of computer cabins in the data centers being out of use and energy usage in these areas were reduced %68, setup time for installing operating system reduced to 4 days to 2 hours (Türkiye Bilişim Derneği, 2012). The telecommunications sector more eager to transfer their system to could environment tha other sectors as in the example of Turkcell Intelligent Cloud and Turkish Telecommunication Cloud Turkey has some cloud application in. Also some municipalities and Small and Medium Size Organizations (KOBİ) have some cloud applications for given services to end users. But it has not being developed systematic applications between governmental organizations. Even some applications of General Directorate of Budget and Fiscal Control, MERNIS, UYAP, EKAP projects has some applications for given services to all governmental organizations none of them cannot be describable as totally cloud applications. Turkey Government Integrated Data Center will be ready to use in near future for the reasons of administrative requirements, cost savings and cyber security requirements. In this cloud application every government organizations which they have self-contained data centers, currently being operated by separately will be combined in a cloud system (Bilim ve Teknoloji Yüksek Kurulu [BTYK], 2013). Also, large technology firms such as Microsoft (Microsoft, 2013) and Intel (Intel, 2013) introduced new IT and cloud technologies in Turkey TTNET which is an internet provider serving in Turkey started a cloud application includes information and communication services called as TTNET Cloud (TTNET Bulutu - Netdisk) (TTNET, 2013).

The international IT companies such as Google developed applications providing online information processing as Google Docs is using widely for individual and academic studies in Turkey (Google Drive) (Google, 2013). Some library and information system suppliers announced new library automation systems include cloud applications in Turkey (such as SirsiDynix BLUEcloud) (SirsiDynix, 2013). Some cloud application oriented educational studies have been initiated in the field of education in Turkey (Sevli, 2011).

Conclusion

Cloud computing is very new in Turkey. It is known that there are corporate users and there is a massive use of community networks which are covered by clouds, such as Facebook. Except from pre-works for the transition of the services to cloud application, today Turkey has no real cloud example in library and information management area. Turkish information technologies sector grew about 10 percent in 2009, and percent in 2010. The Telecommunication Authority of Turkey announced that ICT sector is aimed to reach a size of 160 billion dollars, by 2023 (UK Trade & Investment Sector briefing, 2010). 10th Development Plan of Turkey (2014-2018) includes strong expressions on big data and cloud computing as the one of the important governmental investment in Turkey (T.C. Kalkınma Bakanlığı, 2013, p. 61). In this context, strategies include the creation of public cloud for e-government applications (Yaşa and Çolak, 2011, p. 35; Bilgi Teknolojileri ve İletişim Kurumu [BTK], 2013; Bilgi Çağı, 2012). In addition the investments for the private sector and for SMEs (Small and Medium Size Interprise) were described in the strategies (T.C. Kalkınma Bakanlığı, 2013, p. 110; Bilişim Zirvesi'13, 2013). One of the most important points of cloud computing is data security. The researchers are mostly declared about the insufficiency of legal requirements of cloud computing and data security in Turkey (Henkoğlu and Külcü, 2013; T.C. Kalkınma Bakanlığı. 2012, p. 4-10). On the other hand widespread use of cloud application in governmental services is still under discussion. The lack of legal regulations even Turkey accept the international regulations on cloud applications is one of the reason of the organizations do not intend to use of cloud application. On the other hand widespread use of cloud application in governmental services is still under discussion. Because of control of the data, and data security threats most of the organizations beware of the use of the opportunities of cloud application. These problems can only solvable more international cooperation with the support of international organizations like United Union, European Union etc.

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