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Determinants of a Successful Migration to Cloud Computing in Iranian Telecommunication Industry

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Abstract: The concept of this paper has provided comprehensive frameworks for a successful migration to cloud computing (SMCC) in telecommunication industry in Iran. Using an academic orientation this study attempts to reveal the constructive effects and deconstructive defects of migration to cloud computing with a close regard into prior literature and practical practices all around the world. Conceptual frameworks are deducted from the literature and Telco's revolutionary movements toward CC. The confirmatory quantitative approach tries to verify or reject the validity of determinants of successful migration. Considering these approved factors before any migration decision would be valuable for engaged project members and finally for Telecommunication organizations. This paper can be used as reliable model for any migration beforehand taking any action. Enforcing proper determinants in accordance with the prior success stories and academia viewpoints in Telecommunication industry in Iran as a first mover research in this field provides a precious insight for policy and decision makers to change their mindset and grant a proper space for cloud computing to grow in this industry due to its advantages. Obviously, like any other big Telco in the world, Iranian Telco might start cloud projects to sustain its presence in the global market.

Keywords: Cloud Computing, Telecommunication, Migration, Influencing Factors, Barriers.

1. Introduction

Cloud computing is a novel phenomenon that paves the way for supplying of boundlessly scalable, re-usable, multi-purpose, flexible, cost-saving, efficient and customizable on-demand services and products which is built for delivering real time Internet-driven IT services [1]. Also, CC is a new industry that act upon a web for integration of powerful services and applications which is scaling up and down, is self-healing and reducing the operating costs and as it is elastic and dynamic the customers pay as they are using a partial processing time of a physical server provided by commercial providers where it seems to them as a dedicated server [2]. Regarding the application of Cloud Computing in telecommunication it refers to delivering both application services via the Internet and the hardware and infrastructures of datacenters which provides those services, anytime, anywhere [3].

Identifying the determinants of a successful migration to cloud computing technology in telecommunication sector is required intensive, spread and focused review of literature in different countries, companies and case studies. This paper tries to study and investigate among many related papers to detect the role of cloud computing in Telco companies and datacenters across the globe and then attempts to localize the effectiveness and benefits of clouds in Iran. Eventually, we may conclude the influencing factors and hurdles of Iranian Telecom in migration to cloud-based systems.

The objective of present paper is to investigate the role of cloud computing in Telecommunication industry and to examine the factors influencing and the barriers on successful migration to cloud-based systems in Iran. Two separate conceptual models has deducted from the literature. First constitutes from four influencing factors with positive correlation to successful CC migration (Security, Scalability and Flexibility, Cloud Strategy and Policy and Multi-tenancy). Second implies four barriers

with reverse correlation to SMCC as (Low Bandwidth, Crash and Interrupt, Lack of governmental Laws and Regulations and Organizational Adoption Resistance). The study attempts to conclude which of the mentioned hypotheses would be accepted or rejected in the context of Iranian telecommunication.

In the section two the overview of literature with a new look at the present investigations and practical projects regarding cloud migration if conducted. In section three the research methodology is elaborated while in section four the results of data analysis will be revealed. In discussion section the managerial, theoretical and industrial implications of the research is provided. Finally, recommendations and suggestions for future researchers will be discussed.

2. Review of Literature

In review of literature the prior researches and practical case studies have been studied. For end-users, smart devices and cloud services will be soon an essential part of their daily life and work , where for organizations, the application of ICT technologies in operations will substantially improve their operational efficiency where cloud computing can reduce the costs for information-based enterprise operations, and deliver smarter internet-based management systems then the convergence of information technology (IT) and communications technology (CT) is impacted by several factors, including the augmentation of web-based mobile devices that provide access to cloud-enabled services [7]. Iran ranked 14th among 150 countries in information and communication technologies progress in 2007 and "despite formidable regulatory and legal hurdles, the Iran's telecom market will grow to $12.9 billion by 2014, a CAGR of 6.9 percent" (p. 332) [8]. Therefore, it seems vital for Iranian Telecommunication to move forward CC.

In order to migrate the legacy to CC there are some influencing factors introduced in literature as Security which defined as one of the major concerns of Cloud providers and the main

prerequisite of each cloud-based system [9,10,11]. Scalability and flexibility is introduced as another success factor in cloud systems [12,13]. Cloud strategy and Policy is vital when using CC, network and information deployment strategies and service delivery strategy is needed to accomplish competitive advantage [14]. The last influencing factor is multi-tenancy which drives value in cloud-oriented systems [15].

Considering barriers to a successful migration to CC is lack of capacitated network bandwidth which a critical success factor [16]. Another factor that is a hurdle in CC migration is Crash and Interrupt which make huge losses on companies and even make the companies get out of business [17]. Constructing a regulatory support system is the premier step at cloud computing projects in telecommunication organizations [18] so, lack of governmental laws and regulation can be a barrier in utilizing CC. In transition to CC the organization and managers might manage the change and adoption resistance because cloud seems a threat to the job positions [19].

2.1. Data Source

This paper is very recent, thriving and fashionable. The time periods were mentioned are from 2007 to 2013, where especially more than 90% of the papers and articles appertain to the years 2011, 2012 and 2013. The literature were chosen in a fashion to cover all sort of countries from five continents America (north & south), Africa, Australia, Asia, and Europe. Apparently, the movements of all countries, developed and developing countries including Iran, toward the cloud solutions whether from academic or practical standpoint were investigated precisely.

3. Methods

The study approach in this study is confirmatory quantitative in order to reject or accept the hypotheses resulted from literature review. The sampling method is combination of

purposive and expert sampling. So that the sample frame and sample criteria are carefully set with the help of the validation panel. The assessment and validation panel has been chosen among top managers in Iranian Telecommunication Co. in order to verify and validate the research methodology process, certify the statements in questionnaire and help to set the sample frame and picking the sample size purposefully. The samples were selected among deputies, top managers, center bosses, supervisors, experts and technicians. Regarding data collection process a closed-ended questionnaire with 5-point likert scale structure is designed. The demographic, educational and occupational data are also gathered through different sections in questionnaire. The sample frame determines the samples might be chosen from six IT-driven and technical departments within the organization including the workforce with more than three years of working experience. The sample size is n=150 and the expert participants are selected among N=450.

The reliability of data has been validated by assessment of the questionnaire by panels after a pilot study of n=30 and also by alpha Cronbach which shows the validity of the obtained data so , the data can be generalized to whole population.

In order to accept or reject the hypotheses the multiple regression analysis is performed and correlation matrix and ANOVA test are interpreted. Alongside, descriptive and demographic analyses provide valuable information for internal use of Telecom Co. and the familiarity level of respondents in organization is revealed.

4. Results

According to review of literature four contributing factors improves the success of a cloud migration while four barriers diminish its success. In the context of Iranian Telecommunication the results was surprising. Therefore, four hypotheses are rejected and four of them are accepted. The positive impact of security and scalability & flexibility and the

reverse relationship of Crash & Interrupt and Organizational Adoption Resistance are supported while the other four hypotheses are rejected and did not show any specific relation with SMCC as a reflect of the view points of Telecommunication experts in Iran.

Additionally, the current investigation revealed the role of CC in telecommunication and mentioned some significant advantages as cost effectiveness, agility, 24/7 availability and efficient resource sharing that motivate many Telco leaders to migrate into clouds across the globe [4,5,6]. This can be a catalyst for Iranian Telco to change their mindset about cloud transition. Moreover, the familiarity percentage of the Iranian Telco with the term CC is reported.

5. Discussion

The factors of cost effectiveness, agility, 24/7 service, virtualization [20], multi-tenancy outsourcing and green IT [21] solutions are some of the advantages that cloud computing gives the telecommunication industry.

According to result analysis around 23% of respondents claimed that they have attended in cloud seminars, 16% have participated in cloud projects and me than 70% are familiar with the concept of cloud computing, while only 10% (15) introduced themselves as cloud professionals.

Referring to the regression analysis results obtained the factors influencing on a successful migration to cloud with a positive inclination are security and scalability and flexibility. Thus SMCC get positive impact from security measures and scalability of system while migration process. According to same regression analysis it is accepted that crash and interrupt and organizational adoption resistance are the barriers of successful migration to cloud and they have negative impact on the SMCC.

5.1. Theoretical Implications

This research takes a novel step toward investigation on migration to cloud computing

and the critical success factors and barriers that influences the migration success in the context of telecommunication industry in Iran for the first time. Also, it is for the first time in the literature that a comprehensive framework in this fashion is designated to show the factors with positive and negative relationship with SMCC. This study provides a new look to cloud role in telecommunication

The current study is the first move regarding the evaluation of cloud migration in the telecommunication industry in Iranian literature and the Multimedia University. It grants the academia a new look and regard about the requirements for a migration project to get succeeded. Moreover, it motivates the future researchers to investigate the role of cloud computing in Telco industry more profoundly. Another important academic implication of this research is the study used very recent literature regarding cloud computing, mostly from 2010 to 2013. This brings a very novel insight toward the application of cloud in telecommunication industry.

5.2. Industrial Implications

The cloud computing is a cost saving tool for ICT solutions and it become a green IT tool in 21st century. Obviously, its advantages would not let the Telco providers not to think about it. According to literature and practical reports, cloud computing can open new windows to the benefits for the companies and data centers which exploit the cloud in the near future.

The telecom companies will outsource their switching equipment until 2015 and save to $3.5 billion. Also, they estimate the SAP AG.'s revenue would increase from 83 million euro in 2012 to 900 million euro in 2015 from the cloud projects [22]. This signifies there is huge potential out there for telecom companies to exploit the cloud and cut their on-premise costs. This study attempts to highlight the urgency of moving toward this new paradigm.

5.3. Managerial Implications

In Iranian Telecommunication Co. top managers, managers and technical executives can get novel ideas from technical and practical point of view and to broaden their mindset toward transition to cloud systems. Conducting this research inside one of the Telco head offices will capture the attention of involved managers to take steps toward upgrading their data centers to cloud systems and serve the other organizations as local, national or even international hosting provider that can bring the company notable income. This paper also provides a context for the telecom decision makers and managers in order to understand the vitality of cloud computing in today's business.

5.4. Recommendations

The main aim of this study is to understand the contributing factors and obstacle in the way of a successful migration to cloud computing. So, to pursue the aim it is recommended that future researchers and Telco managers attempt to foster the cloud culture in Telecommunication Co. and even in other branches across Iran. Organizing cloud workshops and seminars are recommended as future actions. These sessions would provide a free-of-work ambiance that helps the Telco workforce to get aquatinted with the term cloud computing and its benefits and advantages would provide to Telco companies. Also the benchmarking of the successful cloud migration by big telecom players across the globe would be very much valuable to change the mind-set of the managers and decision makers to think about the future of the cloud in telecommunication in Iran. Another survey is also suggested after the cloud seminars to measure the attitude of respondents in post-training situation and compare it with the pre-training results.

Another recommendation is to constitute a specialized task force regarding the cloud policies and project planning in order to estimate the advantages and potentials that cloud systems can bestow the telecommunication. In addition, as the data analysis revealed more than 77% of

respondents who were chosen from the range of high-tech employees were claimed that they have never attended a cloud-related seminar or workshop. As a result it is highly suggested that the managers in Telecommunication Co. organize the facilities for holding cloud seminars and workshops. This provides the staffs an opportunity to get familiar with the aspects and expertise of CC. This will lead to address organizational resistance and attract their attention toward having cloud mindset and increase their adoption rate within organization.

Also, from policy implication view point, it is suggested that the Iranian government should start to promote and constitute cloud-specific strategies in national scale.

Last but not least, it is recommended to the future researchers to conduct similar research in other third-party operators in Iran like Irancell, Rightel, etc. This unifies the concept of the cloud computing in telecommunication industry in Iran and gives a comprehensive conceptual model to all telecom policy makers and top managers to make proper and in-time decisions towards the cloud in order to compete in the global market and win the opportunities and grow the national and international competencies and gain competitive advantage via the cloud.

5.5. Avenue for Future Researches

Cloud computing is new phenomenon that bestow several advantages to business advocates. This research provides an avenue for future investigation about the cloud role and effectiveness in Iranian Telecommunication. Additionally, other public utility service providers in Iran like Gas, Water, etc. can start similar research and evaluate the feasibility studies about migration their application and data storage to cloud computing.

Organizing different workshops on cloud computing for the workforce of these organizations and conduct a pre and post workshop surveys from the participators and IT involved staff can be another idea to follow.

Actually, the post surveys will provide researchers with the more accurate data.

Afterwards, as the methodology of this research is based on quantitative approach by using questionnaire, it is recommended that future evaluators employ the mixed method of quantitative and qualitative approach. It is suitable to conduct a quantitative survey and then through the qualitative approach by organizing open-ended interview with experts to verify the findings from quantitative analysis. The content analysis form interview will underpins the results of questionnaires and finally fortifies the final result of similar researches and the determinant of cloud computing would be revealed in a must trustworthy manner.

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