Factors Influencing the Implementation of a Private Government Cloud in Saudi Arabia

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Abstract: The government of Saudi Arabia is in the process of moving to e-government. This transition is hindered by the weakness of ICT infrastructure within Saudi government agencies. The development of a private government cloud is a solution for rapidly improving this infrastructure. An exploratory study is conducted to identify the factors that affect the implementation of such a private government cloud. An expert review has confirmed the ten factors suggested from an initial literature review and identified five additional factors.

1 INTRODUCTION

The use of Information and Communication Technologies (ICT) by governments to provide more efficient and effective services is increasing worldwide (Ndou, 2004). The purpose of e-government is to provide efficient government management of and access to information for citizens, thus enhancing service delivery (UN, 2014).

The different government agencies in Saudi Arabia are at varying levels of ICT maturity, which hinders the horizontal and vertical provision of e-government services (Alghamdi et al., 2014). They also reported that Saudi Arabia is lacking ICT in rural areas and there is insufficient integration among government organisations and their branches.

Cloud computing can be used to help governments quickly develop and strengthen their ICT infrastructure (Wyld, 2009); (Khan et al., 2011); (Tripathi and Parihar, 2011); (Zwattendorfer et al., 2013). It allows governments to uniformly supply e-government services, irrespective of the different maturity levels of different government agencies (Tripathi and Parihar, 2011).

2 LITERATURE REVIEW

2.1 e-Government in Saudi Arabia

Al-Nuaim (2011) notes that, while the Saudi government has the necessary assets to fund e-government, implementation is impeded by the slow growth of government services. Several other challenges and obstacles have been noted which hamper the full implementation of e-government in Saudi Arabia, including infrastructure, cultural and organisational factors. In her study of how effectively e-government had been implemented in Saudi Arabia, Al-Nuaim (2011) found that 8 of 21 (41%) ministries had not yet implemented the main features of an e-government web site. In addition, 10 ministries (45.4%) were completely or partially in the first stage (web presence); 3 ministries (13.6%) were in the second stage (one-way interaction); and 6 ministries had no online service at all. Alfarraj et al., (2013) noted that the Yesser e-government programme had changed its vision from offering electronic services to supporting infrastructure projects, particularly of government organisations, citing weakness in the public sector's infrastructure as a justification for the change in vision.

Alshehri et al., (2012) noted several "systemic barriers to e-government in Saudi Arabia, including IT infrastructural weakness in the government sector, lack of public knowledge about e-government, lack of systems that provide security

and privacy of information, and lack of qualified IT and government service expert personnel."

2.2 Government Cloud

Government clouds are seen as a new model for e-government (Liang, 2012); (Hodgkinson, 2012). Wyld (2009) suggests that the value of cloud computing has great appeal to governments due to the dynamic nature of IT demands and the difficult economic conditions many governments face.

Despite the benefits, there are many challenges and obstacles to using cloud computing in general, and to its use in e-government in particular. Researchers have found that the implementation of such projects in developing countries is more difficult than in developed ones (Schuppan, 2009), and that there are social groups who cannot partake of the benefits of e-government (Helbig et al., 2009).

3 DISCUSSION

Song et al., (2013) state that changes must be implemented in order to introduce cloud computing into an organisation. Yet there has not been any research to date into what changes need to be made for the introduction of cloud computing in Saudi Arabian government agencies to be successful. To help determine the factors that affect the implementation of a private government cloud, government IT experts' opinions were elicited on two questions:

RQ1: What are the factors that pose challenges to the implementation of a private government cloud in Saudi Arabia?

RQ2: What are the factors affecting the successful implementation of a private government cloud in Saudi Arabia?

3.1 Success Factors for Implementation of a Private Government Cloud

A literature review was conducted to answer the questions listed above. The review revealed that several obstacles need to be overcome when developing a private cloud for intergovernmental interaction in Saudi Arabia. By identifying these obstacles, it has been possible to propose ten success factors for the implementation of a private government cloud in Saudi Arabia, as shown in Figure 1.
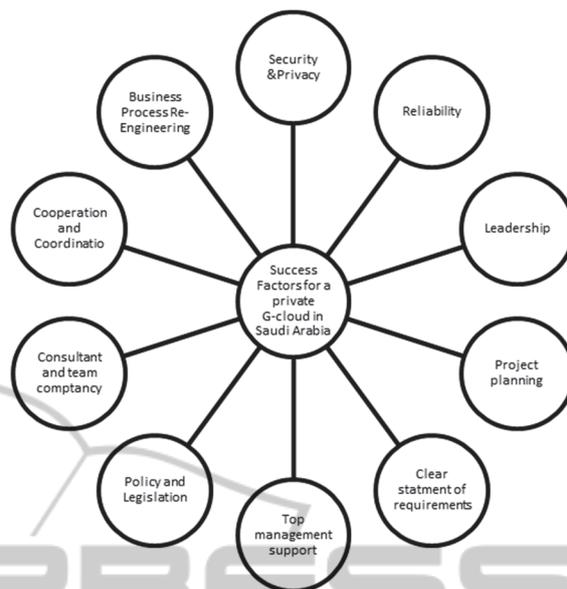

Figure 1: Success Factors for the Implementation of a Private Government Cloud in Saudi Arabia.

3.2 Confirming the Factors

An exploratory study was conducted to confirm the proposed factors with the desk-based study, since there is no basis framework for a private government cloud to work with. To facilitate this study, experts were consulted to review and confirm the proposed factors. The objectives for this expert review were:

- To review the factors identified in the desk-based study to enhance the framework (i.e. add, delete and modify its components)
- To identify additional factors unique to the culture of Saudi government agencies that have not been identified previously by the literature.

4 THE EXPLORATORY STUDY AND ITS RESULTS

The factors proposed were evaluated by interviewing experts working on IT projects within Saudi government agencies. Experts were chosen for interview at this stage since the findings from such a sample have more credibility than those from a sample that includes non-experts (Bhattacherjee, 2012).

4.1 Expert Review Design

The review was based on semi-structured interviews with IT experts from Saudi government agencies.

This research method was chosen because it enables in-depth discussions and exploration to be conducted.

A person was considered an expert if they had at least five years' experience of working on IT projects within a Saudi government agency. These 12 IT experts were recruited from different government and semi-government organisations, and in different locations around Saudi Arabia. The interviews were conducted face-to-face, or over the phone, or online, based on the availability and location of the expert.

The interviews included both closed and open questions. The closed questions were concerned with obtaining the experts' opinions on the factors in the proposed framework. Experts were also encouraged to comment on the proposed factors. The open questions tried to identify further factors that had not been recognised in the desk-based study.

4.2 Expert Review Results

The first question asked of the experts was to give their opinion on the importance of the proposed factors. The second question, was to identify factors not mentioned in the study. The remaining questions were used to identify challenges and barriers to the implementation of a private government cloud in Saudi Arabia. The experts' opinions were analysed to produce the following results.

4.2.1 Review of Proposed Factors

There was consensus among the respondents that all the proposed factors were important except for two anomalies. Expert B did not find Top Management Support an important factor, stating that '*Usually this is not a factor to stop the project*'. Expert F did not consider Reliability and Business Process Re-Engineering to be important since '*Privately run clouds are more efficient than a government operated setup*' and '*where IT services are hosted is not relevant to the actual business processes.*'

4.2.2 Additional Factors

One question asked experts '*What other factors do you recommend to ensure the successful implementation of a private G-cloud?*' This question was intended to identify factors not mentioned in the proposed framework. The answers are summarised in Table 1.

4.2.3 Obstacles

Experts were asked to identify challenges to the implementation of cloud computing. The challenges identified were used to discover additional factors not mentioned in the proposed framework. The answers are also summarised in Table 1.

Table 1: Suggested Factors and Challenges.

Suggested Factors	Suggested Challenges
• Training for the IT-team • Data Knowledge and Quality management • Business Continuity Plan • Disaster Recovery Plan • Communication • Standards and frameworks to govern the cloud services provided • Documentation • Standards for information exchange • Project management office • Transparency	• Product limitations • Data Centre facilities preparation • Lack of local skills in Cloud Computing • Lack of local training facilities • Unrealistic schedules from management to complete projects • Security and Privacy • Interoperability and Portability • Reliability and Availability • Legal aspects • Compatibility with existing systems • Training staff

4.2.4 Expert Review Findings

It was clear that the proposed factors were considered to be unanimously important by the experts, all but Top Management Support, Reliability and Business Process Re-Engineering. One expert each did not consider of the previous factors to be important. Since the majority of the results were found to be in agreement with all the proposed factors, it was not found necessary to remove these factors.

Five additional factors were discovered by synthesising the expert' suggestions. These factors are: Communication, Standards for information exchange, Training for IT staff and end-users, Knowledge management, and Business continuity and disaster recovery plans. Other factors were suggested but were rejected, as they were included as part of the previously proposed factors. The updated factors are shown in Figure 2.

Figure 2: Updated Success Factors for the Implementation of a Private Government Cloud in Saudi Arabia.

5 CONCLUSION

This paper suggests that the implementation of a private government cloud will help strengthen the ICT infrastructure in Saudi government agencies. This will facilitate the Saudi government's e-government initiatives. A qualitative review of the literature identified ten success factors for the implementation of a private government cloud in Saudi Arabia. To confirm these factors an expert review of twelve IT experts from Saudi government agencies was conducted. The expert review confirmed the importance of the proposed ten factors and identified five additional ones. The next step will be to use triangulation to validate these factors.

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