

The Adoption of Cloud Computing Among Private banks Employees in Libya

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Abstract

Cloud computing (CC) adoption by individual received less attention and especially in banking institutions. The purpose of this study is to investigate the factors that affect the CC adoption by employees at the Libyan private banks. Building on the literature, the study proposed that individual factors (performance expectancy (PE), effort expectancy (EE), social influence (SI), attitude (AT), and IT knowledge (ITK) have significant effect on employees' behavioral intention (BI) to adopt CC and user satisfaction (SA) with cloud was proposed to mediate the effect of individual factors on BI. Data was collected randomly from 309 employees in nine Libyan banks. The analysis was conducted using Analysis of a Moment Structures (AMOS). Findings of the study indicated that individual factors affect the BI to use CC. Satisfaction mediated partially the effect of individual factors on BI to use CC. Focusing on individual factors will increase the adoption of CC by employees in private banks.

Keywords: Cloud computing, banking, private banks, user satisfaction, UTAUT

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I. Introduction

The adoption of cloud computing (CC) by banks has not received much attention from researchers (Asadi et al., 2016). Majority of the studies regarding the CC adoptions by banks are industrial reports of CC providers or consultancy companies and it is noticed that the banking industry was a late adopter of the CC technology (Boulton, 2016; IBM, 2016; McKinsey, 2016). Several advantages can be gained by financial institution when using CC technology. These advantages include cost minimization, on-demand usage, business continuity, as well as business agility, and green IT (Boulton, 2016). Nevertheless, one of the most important steps before moving to CC technology is to assess the acceptance of employees for the new technology (Capgemini, 2011).

Despite much research and progress in the areas of CC project, many CC projects have a very high failure rate when it comes to banking organizations (Elzamy et al., 2016). The banking industry is confronting exceptional changes. Control is presently in the hands of the client, instead of the bank. Clients are driving new plans of action. Their utilization of innovation is driving business change. Banks need to respond to this new client driven condition with development in plans of action, activities and IT. For banks, the incentive for distributed computing influences the whole business. Cloud innovation offers another model for conveying inventive customer encounters, compelling joint effort, enhanced speed to showcase and expanded IT productivity. Cloud organizations are spreading and the innovation is ended up being secure (IBM, 2013).

While most researches regarding adoption of CC covers countries with highly developed IT infrastructure, CC is actually used also in less IT-mature countries (El-Gazzar, 2014; Guner and Sneider, 2014). In Libya, the banking industry is suffering due to the ongoing conflict in the era after the collapse of previous regime. Many international reports by the World Bank, the United Nation (UN) referred to the severity of the challenges that face the Libyan economy. Nevertheless, several private banks have introduced the services of online banking in Libya since 2009 but the acceptance of these services are still limited (Mohamed, 2013).

The online banking technology usage rate in Libya is minimal (Eljayash, 2015). The Libyan banking industry is now lagging behind and in extreme need of essential change to enhance its banking system, as it has been continuously criticized for its inadequate and inefficient services (Mohamed, 2013). Previous studies investigated the adoption of technology such as electronic government (E-government), electronic commerce (e-commerce), and electronic business (e-business) (Elkaseh et al., 2015). However, the studies regarding CC adoption in general are few in Libya and in developing countries. In addition, the CC adoption in banking industry is limited in developed and developing countries (Boulton, 2016; McKinsey, 2016; IBM, 2016).

Recent studies showed that the perspective of customers toward the adoption of CC was investigated however; a lack existed in the perspective of employees toward adoption of cloud (Asadi et al., 2016).

Previous studies showed that the unified theory of acceptance and use of technology (UTAUT) model could strengthen the inadequacy of other technology acceptance models such as Technology acceptance model (TAM) (Venkatesh et al., 2003). The model has been used in many disciplines. However, the use of the model in CC is still limited (Cao et al., 2013). Deploying the technology in banks improve their organizational performance and lead to competitive advantages (Alaaraj et al., 2015; Alaarj et al., 2016). The purpose of this study is to examine the effect of individual factors on the adoption of CC among employees in Libyan private banks. Among individual factors, the study focusses on the factor of UTAUT such as PE, EE, SI, AT and ITK were incorporated based on the literature. The next section discusses the literature review, research methodology, findings, discussion, and conclusion.

II. Literature Review

This section discusses the CC and the development of the hypotheses.

2.1 Cloud computing and Banking

CC is a new technology in the information technology that have been recently developed to enable users and business to access software, hardware, and application on demand basis from anywhere (Low et al., 2011; Shawish and Salama, 2014). Therefore, the cloud resulted in shifting the applications to service platform rather than to be installed on the personal computers of users. A widely used definition of CC is provided by the American National Institute of Standards and Technology (NIST). NIST defined it “a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction”(Mell and Grance, 2011).

Researchers agreed that for CC, there are three main layers that are the Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS)(Lian, 2015; Low et al., 2011). In addition, researchers also highlighted the importance of the deployment of CC. One important consideration for the adoption of CC is the deployment of a cloud-based computing resource. CC deployment can be divided into four types: private clouds, public clouds, community clouds, and hybrid clouds (Mell&Grance, 2011;Lian, 2015).Each deployment model has its benefits and drawbacks (Zhang and Chen, 2010). The decision of choosing a proper CC deployment model should consider technological as well as organizational factors (Zhang and Chen, 2010).

The usage of CC by banks can make an agile and adaptable banking condition that can react rapidly to new business necessity. This is additionally taken a toll sparing, as banking institution are required to pay on the usage-based for useful utilization and the services that they utilize(Alaaraj et al., 2017; Alaarj et al., 2017; Patani et al., 2014).Albeit numerous extensive banks are sure about the acknowledgment of cloud innovation, others are more watchful and anticipate the administrative difficulties to be addresses before hopping onto the temporary fad. With serve and tight monetary related confinements, develop fiscal programming commercial centre and quickly evolving controls, there is requirement for banks to seek after innovative answers for meeting business prerequisites in today server competitive environment(Alaaraj et al., 2017; Apostu et al., 2012).

2.2 Conceptual Model and Hypotheses Development

This study uses mainly the UTAUT. The study focuses on the effect of individual factors on the adoption of CC in banking industry in Libya. Several researchers operationalized human or individual factors into dimensions. For example, Lian et al. (2014) investigated human factor effect on the adoption of CC e-government and included factors such as EE, PE, and SI. Liu et al (2008)deployed individual factors to test the adoption of new technology. In this study, individual factors are divided into PE, EE, SI, AT, and ITK. The choice of these factors and grouping them under individual factor construct is supported by previous studies. PE, EE, and SI are individual factors according to Venkatesh et al. (2003). ITK is related to the knowledge of individual regarding the use of a specific technology (Al-Masri and Ahmad, 2017), AT toward the technology is an individual oriented trait (Davis, 1989). User satisfaction with the technology is a core variable that can enhance the explanation of the relationship between individual factors and technological factor in one hand and the BI on the other hand. Thus, this variable is proposed as a mediator between individual factors and technological factor, and the BI to use the CC. Figure 1 presents the proposed framework of this study.

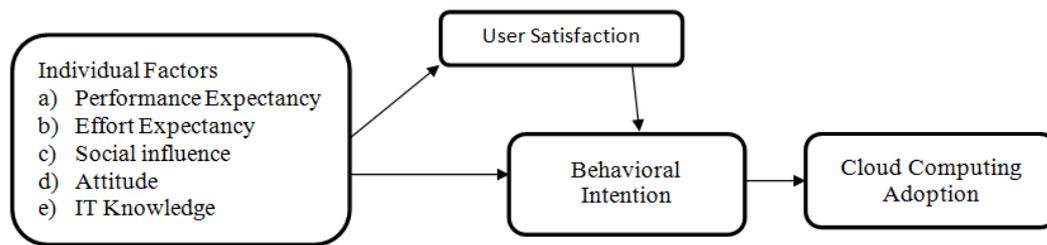


Figure 1: Proposed Conceptual Model

2.2.1 Individual Factors

Individual factors are defined in this study as “the factors that concern the individual and lead them to adopt the CC technology”. These factors includes PE, EE, SI, AT, and ITK. Lian et al. (2014) investigated the CC adoption and found that human factors has a significant effect on the adoption of CC. Liu et al. (2011) also found that the individual factors affect significantly the adoption of EDI technology. In this study, individual factors are expected to affect the behavioural intention to use the CC in the banking industry in Libya. Thus, it is hypothesized:

H1: Individual factors affect positively the BI

2.2.2 Performance Expectancy

PE is defined as “the degree to which an individual believes that adopting the technology will help him or her to increase the work performance” (Venkatesh et al., 2012). Many studies in the CC field have demonstrated empirically that the PE affect the BI of users to adopt the technology. UTAUT studies on adoption of CC showed that the expected benefits of the CC might increase the users' intention to adopt the technology (Park and Kim, 2014). Cao et al. (2013) found that CC adoption is highly affected by PE. In this study, it is hypothesized that:

H2: PE has significant effect on BI.

2.2.3 Effort Expectancy

EE is defined as “the degree of ease associated with the use of the technology” (Venkatesh, et al., 2012). Lian (2015) has employed the UTAUT model to investigate the adoption of E-invoice using the CC. The findings showed that EE influences the adoption of CC services. Cao et al. (2013) and Bellaaj et al. (2015) found that EE has a significant effect on the intention to use CC in China and Saudi Arabia respectively. In this study, it is hypothesized:

H3: EE has a significant effect on BI

2.2.4 Social Influence

SI is defined as “the degree to which an individual perceives that it is important others believe he or she should use the new technology” (Venkatesh, et.al. 2012). The UTATU model emphasized that SI plays an important role in IT adoption (Venkatesh et al., 2003). SI affects user adoption of CC (Lian, 2015). Park and Ryoo, (2013) found that SI positively affects users' intention to use CC. Wu (2011b) found that SI affects the adoption of SaaS. Similarly, the study of Wu, (2011a) empirically found that SI is one of the key predictors of the adoption of CC. Therefore, it is hypothesized:

H4: SI has a significant effect on BI

2.2.5 Attitude

AT refers to “an individual's positive or a negative evaluative effect about performing a particular behavior” (Albakri et al., 2014). Previous studies have proposed and tested the AT toward technology. Albakri et al. (2014) found empirically that AT toward technology is one of the most important indicators for the adoption of M-banking. Researchers related the issue of CC adoption to the perception and ATs of adopters. Wu (2011) found that AT toward the CC is essential for the adoption of the technology. Similarly, Arpaci (2016) pointed out that AT is an important factor for the adoption of CC. Arpaci, Kilicer and Bardakci (2015) found that AT affect significantly the BI to adopt CC. Thus, it is hypothesized:

H5: AT toward technology has a significant effect on the BI

2.2.6 IT knowledge

ITK refers to “the level of knowledge of the employees toward using new technology”(Lian et al., 2014). If employees have IT competences, then it would have a more positive AT towards this new innovation. In other words, if the employees possess the necessary skills to adopt CC, then they would have more likelihood of being confident to engage in this process (Lian et al. 2014). Picoto et al.(2014)predicted that ITK affects the usage and performance of CC. In similar approach, (Dehkordi et al., 2011)found that ITK an important factor for the adoption of E-government in Iran. In this study, it is hypothesized:

H6: ITK has a significant effect on BI

2.2.7 Behavioral Intention and Cloud Adoption

BI is defined as “a person's perceived likelihood or subjective probability that he or she will engage in a given behavior” (Venkatesh et al., 2003). Most previous model in technology acceptance proposed that BI affects the use behavior of new technology (Davis, 1989). Bellaaj, Zekri and Albugami (2015)found that BI affects the use behavioral of educational technology system. Arpaci, Kilicer and Bardakci (2015) found that BI affects the CC usage in educational institutions. In this study, it is hypothesized that:

H7: BI has a significant effect on CC adoption.

2.2.8 Mediating Role of User Satisfaction

SA is defined as “an affective state that is the emotional reaction to the entire CC experience of a user” (Burda and Teuteberg, 2014). Park and Kim (2014) investigated the effect of SA on the intention to use mobile cloud services and found the effect is significant. Pilevari, Toloei and Sanaei (2013) pointed out that users would adopt and use the technology once they are satisfied with it. Burda and Teuteberg (2014) found that satisfaction with the technology affects positively the trust as well as the usefulness of the cloud. DeLone and McLean(2003)proposed proposing SA as a mediator between information quality, system quality and service quality, and the intention to use of technology. Wixom and Todd (2005)found SA mediate partially the effect of service and system quality on ease of use and usefulness. It is well established in the marketing research that SA can mediate the relationship between variables (Chiu and Francesco, 2003; Rezvani et al., 2016; Spagnoli and Caetano, 2012). However, this relationship needs to be examined in CC adoption field. Thus, it is hypothesized:

H8: SA mediates the effect of individual factors on the BI

III. Research Methodology

The population of this study includes all the private banks in Libya ,which have experience of online banking and intended or have a CC technology existed in their banks. According to the central bank in Libya, the country has 18 public and private banks. The total banks that using the online banking are 11 out of which nine are private banks. These nine banks are the target population of this study. Number of employees at these banks are estimated to be 26000 employees including the branches of the banks. Out of the 26,000, there are 6000 employees who are involved in IT related tasks. These 6000 are the target population of this study. This study uses the random sampling selection method to determine the sample size from the population. Accordingly, the sample size of this study is 361 and it is sufficient for the use of AMOS (Lowry and Gaskin, 2014).

3.1 Instrument of the Study

This study is using a questionnaire as a tool for data collection. The questions are measured using five-point Likert scale. PE (5 items), EE (5 items), SI (5 items), and BI (5 items) were adopted from Lian (2015). AT (4 items) was adopted from Davis (1989). ITK (5 items) was adopted from Dehkordiet al. (2011) and use behavior (8 items) was adopted from Gupta et al. (2013) and Davis et al. (1989). Two experts validated the instrument of this study and a pilot testing was conducted to ensure that the measurements are reliable. Cronbach's Alpha for all the measurement were greater than 0.70 indicating the reliability of the measurements.

3.2 Data Collection

After confirming the instrument validity and reliability, the field data collection took place between February and July, 2017. A total of 397 online questionnaire were mailed out to respondents. Follow up procedures were applied to increase the response rate. Emails and other social media tools were used to post the questionnaire and request to be answered by IT staff in the banks. A total of 324 responses were collected representing a response rate of 69%. These responses are sufficient for the use of AMOS (Alaaraj et al., 2018).

3.3 Data Examination

A series of analysis was conducted to refine and prepare the data. Missing value analysis showed that there is no missing value. Outliers analysis indicated the existence of 15 univariate and multivariate outliers. This has resulted in 309 complete and usable responses. The data is normally distributed and the value of skewness and kurtosis are within the recommended range of less than absolute value of two and there is no multicollinearity issue because the tolerance is greater than 0.10 and the variance inflation factor (VIF) is greater than 10.

IV. Data analysis

The data was analysed using SPSS and AMOS version 22.0. This section presents the profile of respondents and the result of hypotheses testing.

4.1 Demographic Information

Table 1 shows the demographic information of the respondents. A total of 309 respondents has participated in this study. Respondents are males (76.7%) while females accounted to 23.3%. A total of 37.9% of the respondents are between 20 and 30 years while 50.8% are in the age group between 31-40. A total of 9.1% are older than 40 and younger than 50. Those who are above 50 years accounted to 2.3%. The respondents are holders of bachelor's degree (77%) while 5.8% are holders of master degree and 1.9% are holders of PhD degree. They have access to internet and CC with 58.9% have experience of using the internet for more than six years and less than nine years. 37.2% have experience of more than nine years. A total of 3.9% have experience between two to five years.

Table 1: Background of the Respondents

| Variable | Label | Frequency | Percentage |
|------------------------------|-------------------|-----------|------------|
| Age | 20-30 years | 117 | 37.9 |
| | 31-40 years | 157 | 50.8 |
| | 41-50 years | 28 | 9.1 |
| | above 50 years | 7 | 2.3 |
| Gender | Male | 237 | 76.7 |
| | Female | 72 | 23.3 |
| Education | Diploma | 47 | 15.2 |
| | Bachelor | 238 | 77.0 |
| | Master | 18 | 5.8 |
| | Ph.D. | 6 | 1.9 |
| Access | Yes | 309 | 100.0 |
| Length of using the Internet | 2-5 Years | 12 | 3.9 |
| | 6-9 years | 182 | 58.9 |
| | More than 9 years | 115 | 37.2 |

4.2 Measurement Model

Measurement model was conducted to assess the model of this study. In this stage, the factor loading as well as the indices were checked. Factor loadings were greater than 0.60. Almost all the indices such as goodness of fit index (GFI) was 0.891, Tuckerlewis index (TLI) was 0.952, Comparative fit index (CFI) was 0.946, and Chisq/df was 2.931, were achieved. The CFI is below the threshold of 0.90. However, Hair et al. (2010) suggested researchers to proceed with the analysis if three of the indices were achieved.

4.2.1 Convergent Validity

Convergent validity is achieved when the factor loading is greater than 0.60, Cronbach's Alpha greater than 0.70, composite reliability greater than 0.70, and Average Variance Extracted (AVE) is greater than 0.50. Some of the items were deleted to improve the indices and achieve the validity. Table 2 shows that all the thresholds were achieved. Thus, convergent validity was met.

Table 2: Convergent Validity of Sub-Variables

| Variables | Factor loading >0.60 | Cronbach's Alpha >0.70 | Composite Reliability >0.70 | Average Variance Extracted >0.50 |
|-----------|----------------------|------------------------|-----------------------------|----------------------------------|
| AT | .909-.927 | 0.946 | 0.936 | 0.831 |
| PE | .875-.921 | 0.951 | 0.944 | 0.810 |
| EE | .901-.919 | 0.949 | 0.945 | 0.812 |
| SI | .794-.857 | 0.920 | 0.917 | 0.688 |
| ITK | .906-.939 | 0.963 | 0.960 | 0.859 |

| | | | | |
|--------------|-----------|-------|-------|-------|
| BI | .828-.887 | 0.931 | 0.920 | 0.742 |
| Use Behavior | .731-.937 | 0.912 | 0.906 | 0.709 |
| SA | .807-.873 | 0.911 | 0.905 | 0.705 |

4.2.2 Discriminant Validity

The discriminant validity of the variables was achieved because the square root of AVE (bold and underlines) is greater than the cross loading of the variables. Table 3 shows the discriminant validity.

Table 3: Discriminant Validity

| AT | PE | EE | SI | ITK | BI | Use behavior | SA |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <u>0.911</u> | | | | | | | |
| 0.410 | <u>0.900</u> | | | | | | |
| 0.559 | 0.670 | <u>0.901</u> | | | | | |
| 0.550 | 0.730 | 0.703 | <u>0.830</u> | | | | |
| 0.540 | 0.458 | 0.496 | 0.521 | <u>0.927</u> | | | |
| 0.187 | 0.203 | 0.190 | 0.235 | 0.335 | <u>0.862</u> | | |
| 0.096 | 0.066 | 0.092 | 0.166 | 0.184 | 0.465 | <u>0.842</u> | |
| 0.075 | 0.038 | 0.036 | 0.151 | 0.197 | 0.522 | 0.401 | <u>0.840</u> |

4.3 Hypotheses Testing

Structural model was conducted to test the hypotheses. All the indices were achieved except GFI.

4.3.1 Direct Effect

The hypotheses testing of the direct effect of individual factors is presented in Table 4. The table shows the hypotheses number (H), dependent variable (DV), independent variable (IV), standard error (S.E), critical ratio (C.R), and p-value (P).

Table 4: Result of Hypotheses Testing of Individual Factors

| H | DV | | IV | Estimate | S.E. | C.R. | P | Label |
|----------------|-------------|------|--------------------|----------|------|-------|------|-----------|
| H1 | BI | <--- | Individual Factors | .363 | .105 | 3.455 | .001 | Supported |
| H2 | BI | <--- | PE | .246 | .055 | 4.459 | .001 | Supported |
| H3 | BI | <--- | EE | .191 | .052 | 3.647 | .001 | Supported |
| H4 | BI | <--- | SI | .015 | .064 | .234 | .116 | Rejected |
| H5 | BI | <--- | ITK | .147 | .056 | 2.597 | .009 | Supported |
| H6 | BI | <--- | AT | .130 | .057 | 2.292 | .022 | Supported |
| H7 | CC adoption | <--- | BI | .291 | .081 | 3.521 | 0.01 | Supported |
| R ² | .592 | | | | | | | |

The table shows that the individual factors has significant effect on the BI toward CC in Libyan banks. Thus, H1 is supported. For the effect of PE, it can be seen in Table 4 that the effect is significant. Thus, H2 is supported. Similarly, for H3,5,6,7 it can be seen that the effect of other variables such as EE, ITK, and AT are also significant. The effect of BI on CC adoption is significant. However, it can be seen from Table 4 that the effect of SI on the BI is not significant (Estimate=0.015, P>0.05). Accordingly, all the hypotheses are supported except the SI (H4). The model was able to explain 59% of the variation in the BI to adopt CC.

4.3.2 Mediating Role of User Satisfaction

The eighth hypothesis predicted that SA mediates the effect of individual factors on BI (H8). Table 5 presents the result of mediation role of SA.

Table 5: Result of Mediation Role of SA

| H | D.V | | I.V | Estimate | S.E. | C.R. | P | Label |
|----|--------------------|------|--------------------|----------|------|-------|------|-----------|
| | Behavior intention | <--- | SA | .180 | .059 | 3.049 | .002 | Supported |
| H8 | BI | <--- | Individual Factors | .290 | .102 | 2.84 | .001 | Supported |
| | SA | <--- | Individual Factors | .160 | .072 | 2.22 | .007 | |

Table 5 shows that the direct effect of individual factors on BI reduced from .363 in Table 4 to .290 in Table 5 (after including the mediator). This indicates that the mediation occurred. In addition, the indirect effect through SA is significant. Since both; the direct effect and the indirect effect are significant, the mediation is partial and H8 is supported.

V. Discussion

This study investigated the adoption of CC by employees at Libyan banks. The study found that individual factors are important predictors of the BI toward CC adoption. The most important factor is the PE followed by EE, ITK, and AT. In addition, the BI affects the CC adoption. Furthermore, the study found that SI is not significant predictor of the BI. The findings of this study are in agreement with the findings of the literature. Previous studies found individual factors is important predictor for adoption of CC (Lian, 2015). PE as well as EE affect significantly the adoption of CC technology (Bellaaj et al., 2015; Lian, 2015; Cao et al., 2013). BI affects the CC adoption (Arpaci et al., 2015). In addition, the SA has a partial mediating effect indicating that SA can explain part of the relationship between individual factors and BI. Venkatesh et al. (2003) pointed out that the innovations take time to diffused and this could explain the insignificant effect of SI.

Investigating the individual factors provides the decision makers with information regarding the factors that concern the employees who are going to use the CC system. The PE, EE, AT and ITK are the most critical factor that decision makers have to focus on when developing and adopting CC system.

VI. Implications

This study investigated the adoption of CC among employees at private banks in Libya. Studies pertaining to CC in developing countries are limited and this study has contributed in this regard. The study investigated the CC adoption factors using the UTAUT model. The study has enriched the literature and filled the gaps related to the use of UTAUT in CC. In addition, the study enriched the literature with academic article that tackle the issue of CC adoption by banks.

The findings of this study are generalizable on all the Libyan private banks and it can be carefully generalized on other countries providing that the culture, ITK, and CC adoption factors are similar in these countries. In other words, the finding might be generalized on developing countries, but it would be difficult to generalize the finding on developed countries due to the differences of technology usage and level of ITK and IT infrastructure in these countries.

VII. Conclusion

There are some limitations in this study that can be used as avenues for future works. This study was conducted on Libyan private banks. Thus, findings might not be generalized on the public banks, which follows different procedures and requires high routine in decision making. Hence, future researchers are recommended to investigate the adoption of CC by public banks. In addition, the study was conducted on employees, customers were not involved in this study. Thus, to include the customers, future researchers have to add factors related to the customers adoption and usage of banking CC system. The study tested hypotheses related to individual factors. Future studies can add other factors such as organizational and technological factors.

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