FACTORS INFLUENCING CITIZEN’S USAGE OF E-GOVERNMENT SERVICES IN DEVELOPING COUNTRIES: THE CASE OF EGYPT

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Abstract

Today most governments across the globe encourage initiating contact through the Internet to provide citizens with more convenient and accessible public services. This channel is known as government-to-citizen electronic government application (G2C e-government). Although studies in e-government are increasing in number, related models offered in the academic literature are mainly conceptual; while empirical studies are heavily ignored. Moreover, the existing literature focused on developed countries, while the worldwide growth of e-commerce has shown the need to extend this research to other unstudied developing countries. Therefore, our research attempts to fill this gap in the literature by developing and validating an empirical-based model for systematically predicting and examining the various critical factors influencing citizen intention to use public e-services in developing countries, and enhancing the probability of their participation, as well as, examining the actual implementation of e-government applications in Egypt as an example. In contrast to previous works, the current empirical study extended the research scope by combining the most critical factors identified in literature and applied them in the local context, therefore our proposed model contained variables that have not been integrated into one framework, to examination simultaneously for validation and relationship. A richer research methodology is used in our empirical study combining quantitative and qualitative methods. Based on our findings the study has made a number of important managerial and academic implications. The results of this paper can be re-examined or extended to other developing countries to create a complete picture in this area.

Keywords: Citizens’ Usage, Developing countries, e-government Services, G2C e-Gov, Public e-services

I. INTRODUCTION

Today most governments across the globe encourage initiating contact through the Internet to provide citizens with more convenient and accessible public services. This channel is known as government-to-citizen electronic government (G2C e-government) application (see Beldad et al., 2012; Reddick and Turner, 2012; Almazan and Garcia, 2012; Karlsson et al., 2012). By using e-government websites, citizens can get better public services, faster than face-to-face services, from anywhere and anytime, and from the government side, the more citizens use these applications, the more operation and management costs can be reduced (Reddick and Turner, 2012; Yaghoubi et al., 2011; Deakins et al., 2010; Butter et al., 2012; Chun et al., 2012; Youngblood and Mackiewicz, 2012).
In line with the above, others (e.g. Lin et al., 2011; Mutula and Mostert, 2010; Shyu and Huang, 2011; Bertot et al., 2012) indicated that e-government is a fundamental element in the modernization of any government, serving as a means towards enhancing transparency, accountability, making the government more result-oriented and citizen-centered; and enabling citizens to access government services and information as efficiently and as effectively as possible through the use of Internet, with high level of satisfaction compared to traditional services channels (Reddick and Turner, 2012; Smith, 2010; Karlsson et al., 2012). Nevertheless, the expected returns on investment (ROI) for e-government applications are extremely high. As these benefits have become more apparent, the number of countries employing e-government as an effective channel for citizen–government interaction services began to increase (Reddick et al., 2011; Karlsson et al., 2012; Ozkan and Kanat, 2011; Wang and Chen, 2012).

However, in developing countries, specifically those in Africa, the low usage level of e-government services and the slow rate of adoption are still recognized as endemic problems for e-government implementation (Yaghoubi et al., 2011; Ochara, 2010; Rorissa and Demissie, 2010), therefore there would seem to be some merit for more studies to empirically examine factors influencing the citizen’ intention to use e-government applications at unstudied developing countries, as a prerequisite for successful implementation. The current research is an attempt at this direction.

II. RESEARCH PROBLEM, OBJECTIVES AND PLAN

Although studies in e-government are increasing in number, related models offered in the academic literature are mainly conceptual; while empirical studies are heavily ignored (e.g. Reddick and Turner, 2012; Sriyastava, 2011; Shareef et al., 2011; Beldad et al., 2012). Moreover, the existing e-government literature to date focused on developed countries, with a greater predisposition toward the Internet, while the worldwide growth of e-commerce has shown the need to extend this research to other unstudied developing countries (see e.g. Rorissa and Demissie, 2010; Ochara, 2010; Lin et al., 2011; Weerakkody et al., 2011; Miyata et al., 2011; Weerakkody et al., 2012).

Therefore, our research attempts to fill this gap in the current body of literature by developing and validating an empirical-based model for predicting and examining the various critical factors influencing citizen intention to use e-government services in developing countries, and enhancing the probability of their participation, as well as, examining the actual implementation of e-government in the local contexts of Egypt as an example.

In sum, the present investigation adds to literature through achieving the following objectives: (1) identify the potential critical factors that have the most significant influence on citizen’ intention to use e-government services, (2) determine the relative importance of each of these factors for government agencies or e-government services providers in order to enhance online citizens participation, (3) develop and validate a mathematical model, that can predict the probability of using e-government applications based on empirical evidences, (4) examine the extent to which e-government is actually applied in Egypt as an example of developing country.

With these objectives in view and in light of the preceding discussion, the current paper has been organized as follows: the literature and relevant studies were reviewed and analyzed. Then a research model was proposed and hypotheses were formulated to be tested in the study. This was followed by an explanation of the procedures used to obtain data, measurement, and validation processes, as well as the testing of the hypotheses stated. Finally, based on our findings a series of conclusions with managerial implications and final thoughts that emphasize the great interest in the topic under analysis were presented; and then certain limitations and future lines of research with regard to this issue were highlighted.

III. LITERATURE REVIEW

Relevant literature and past research were extensively reviewed and integrated sequentially, including a wide range of recently published works, in order to develop more effectively the study’s hypotheses and the research model. E-government has been conceptualized and defined in multiple ways in literature. Taking an operational perspective for instance some authors defined e-government as the use of information and communication technologies, primarily the Internet, to transform government operations for improving the efficiency of the administer governmental systems (e.g. Lin et al., 2011; Sriyastava, 2011; Bannister and Connolly, 2011; Reddick, 2011; Reddick et al., 2011; Valdés et al., 2011; Reddick and Turner, 2012; Robertson and Vatrapu, 2012; Chun et al., 2012; Yuan et al., 2012; 2011; Weerakkody et al., 2012; Bonsón et al., 2012; Yang et al., 2012).

Others viewed it from the broader perspective of government stakeholders, namely citizens (G2C e-government), business organizations (G2B e-government)
and government itself (G2G e-government), thus they defined e-government as the use of Internet and other information technologies for delivering public services and information to citizens, business and employees (e.g.; Carter et al., 2011; Lee et al., 2011; Valdes et al., 2011; Karunasena et al., 2011; Deakins et al., 2010; Navarro et al., 2012; Karunasena and Deng, 2012; Karlsson et al., 2012).

For the current study purpose, we adopted the last broader concept of e-government and referred, for short, to the electronic public services delivered through government agencies websites as public e-services, which involving national security, social services, national infrastructure, entitlements, regulation, science, environment (Hassan et al., 2011).

The extensive revision of available literature, which provided the conceptual foundation for our study, revealed some factors considered important in influencing citizens’ intention to use public e-services. Given that different studies identified different factors. For example, Udo et al. (2012), Lin et al. (2011), Yaghoubi et al. (2011), Sang et al. (2010), and Shyu and Huang, 2011 addressed two main variables, which previously identified in the technology acceptance model (TAM), perceived usefulness (the extent to which citizen believes that using e-government would enhance his or her efficiency) and perceived ease of use (the extent to which citizen believes that using e-government services will be free of effort).

Additional factors can be found in other prior works. For instance, Ozkan and Kanat (2011), Bannister and Connolly (2011), Lee et al., 2011; Smith (2010) and Butter et al. (2012) proposed perceived trust in government agencies websites (how citizen’ expectation meet the perceived actual functioning of e-government). They observed that perceived trust has a positive impact on citizens’ attitude toward e-government, as it enhance their expectation of the outcomes.

One the other hand, Carter et al. (2011), Carter and McBride (2011), Liao et al. (2011) and Bhattacharya et al. (2012) reported that perceived privacy (the extent to which citizen believes that his or her personal data are not disclosed by any unauthorized access) and perceived security (the extent to which website considered safe for financial purposes and has adequate security features) are a major concern for e-government users at developing countries, as they always feel a lack of privacy and security. During interaction with government websites citizens are afraid that websites can disclose, share, or misuse their personal data, or hackers can intercept financial transactions.

Shareef et al. (2011) proposed perceived service response as an influencer factor on citizen intention to use e-government services. They suggested that if citizens feel that there is an inadequate service response in government websites when they require it or being treated unfairly, they are less likely to adopt e-government, rather they will go to physical government offices to seek services.

In the same way as the previously mentioned study Carter et al. (2011) also proposed a personal factor, they indicated that citizens who have experience with the Internet (they referred to it as web self-efficacy) regarding searching for information or making online transactions will be more likely to use public electronic services.

IV. DEVELOPING THE HYPOTHESES AND RESEARCH MODEL

Drawing upon the earlier discussion, based on the theoretical background as well as the feedback obtained from our preliminary study the research model was proposed, which incorporated many of the relevant features of e-government adoption identified in the literature the following hypotheses have been advanced to be simultaneously tested:

\begin{align*}
H_1 & : \text{Perceived security positively influences the citizen’s intention to use public e-services} \\
H_2 & : \text{Perceived privacy positively influences the citizen’s intention to use public e-services} \\
H_3 & : \text{Perceived trust positively influences the citizen’s intention to use public e-services} \\
H_4 & : \text{Perceived usefulness positively influences the citizen’s intention to use public e-services} \\
H_5 & : \text{Perceived ease of use positively influences the citizen’s intention to use public e-services} \\
H_6 & : \text{Perceived service response influences the citizen’s intention to use public e-services} \\
H_7 & : \text{Personal experience with the Internet influences the citizen’s intention to use public e-services} \\
H_8 & : \text{The usage of e-government application is positively associated with the citizen’ intention to use public e-services} \\
H_9 & : \text{Citizens tend to access public e-services regularly}
\end{align*}

Symbolically, the prediction multiple regression equation of the research model (EQ1) can be formulated as follows, to predict the probability of citizen’s intention to use e-Gov services (criterion variable: YINT), served as regress, given known values from a set of predictor variables (PSE, PRI, PTR, PUS, PEU, PSR and PEX), used as regressors.
EQ1:
\[ Y_{INT} = a + b_{PSE} \cdot PSE + b_{PUS} \cdot PUS + b_{PTR} \cdot PTR + b_{PUS} \cdot PUS + b_{PEU} \cdot PEU + b_{PSR} \cdot PSR + b_{PEX} \cdot PEX \]  

Where:
- PSE = Perceived security
- PRI = Perceived privacy
- PTR = Perceived trust
- PUS = Perceived usefulness
- PES = Perceived ease of use
- PSR = Perceived service response
- PEX = Personal experience with the Internet
- \( Y_{INT} \) = Citizen’s intention to use e-Gov services
- \( X_{USE} \) = Actual usage rate

In order to validate this model a number of validity tests have been applied and relationships among its variables have been empirically examined. The conceptual basis for our hypotheses generally does not vary by developing countries, therefore country-specific predictions for Egypt not included.

V. RESEARCH METHODOLOGY

A richer research methodology is used in this study combining quantitative and qualitative methods to validate the research model. Thus, the research process involved multi-stage procedures as follows:

Preliminary Qualitative Study

In this stage, a series of in-depth interviews were held to get deeper understanding of the phenomenon under investigation, and establish the criteria and relationship constructs relevant to our empirical study. Issues arising from this stage were used as a basis for the next quantitative study.

Quantitative Study

The quantitative stage in the form of personally-administrated questionnaire survey was conducted over three-month period to collect empirical data. The participants were the Egyptian citizens who are dealing with different government agencies online or offline. Simple random sampling was carried out in order to gain as many representative samples as possible. To increase generalizations of the results the participants were spread across five major cities (Cairo, Alexandria, Tanta, Suez and Aswan) in Egypt.

Instrument and Validity

To develop our instrument a number of prior relevant studies and corresponding scales were reviewed to ensure that a comprehensive list of measures was included and the major aspects of the topic were adequately covered. Multi-items measures were generated for each construct and assessed for the reliability and content validity. Each questionnaire items were measured using 7-point multi-item Likert scales. The questionnaire was originally developed in English, and subsequently translated into Arabic language. The questionnaire was then pre-tested among 25 respondents. Based on the pre-test feedback, modifications have been made to improve readability and accuracy. The revised questionnaire was again pre-tested among a set of 15 respondents. The final version was found worked well and the instrument has confirmed content validity.

Research Design and Reliability

The research design for this study involved a cross-sectional survey methodology, which was conducted between March and May, 2012. Among a total of 850 questionnaires that were randomly distributed, 328 valid responses were received and used in data analysis, after removing invalid answers, achieving a 38.59 percent usable response rate for the overall survey. Despite the relatively low response rate, which thought to be expected for social sciences in general and in developing countries context particularly, the fact that the respondents were as representative of the population as possible, led to their contribution being regarded as providing information applicable to the larger population. The reliability of instruments was assessed using Cronbach's alpha coefficient test. The test showed an acceptable degree of internal consistency reflecting a strong reliability, all alpha values over 0.7 (\( \alpha > 0.7 \)).

VI. DATA ANALYSIS AND MODEL TESTING

The empirical data collected by the survey enabled the current research to obtain the perception of a relatively large number of citizens and then empirically test their responses using statistical software packages (SPSS). Multiple regression analysis with its associated statistical inference tests (F test and t-test on b), correlation and descriptive analysis were performed, to investigate the strength and direction of the hypothesized relationships among the model’s constructs.
The results of testing Hypotheses 1 to 7:

Hypotheses 1 to 7 were tested collectively using multiple regression analysis. This statistical technique is especially powerful for analysing associative relationships between one or more independent variables and a metric dependent variable and predicting its values, which is the case of our current study. The summary output of the regression analysis, in table 1, led to accept these hypotheses and the statistical significance test supported this acceptance.

A strong significant meaningful correlation is found between citizen' intention to use public e-services and the above mentioned independent variables (Multiple correlation coefficient: Multiple R= 0.094692078). The F statistic value (F=396.649036525163 at p < 0.0000 level) is statistically significant indicating that the results of the model could hardly have occurred by chance. Thus, the goodness-of-fit of the model is satisfactory.

The coefficient of determination, multiple R-square showed that these predictor factors explained the major proportion (89.66 %) of the variability observed among citizens intention (R² =0. 89665896), which reinforce our confidence in the hypotheses testing results and provides support for the above mentioned association.

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Furthermore, the adjusted-\(R^2\) of the model, which is a more conservative estimate of variance by considering error variance, is 0.89439837. Thus, the overall explanatory power of the research model is considered high and quite capable of explaining the variance of the citizen intention (The criterion variable \(Y_{\text{INT}}\)).

Using the values of the regression coefficients, presented in table 2, the future intention of citizens to use public e-services can be predicted, in this study, by the following equations (EQ2) and the impact of each predictor variable on the criterion variable can be assessed by standardized beta coefficients.

EQ2:

\[
Y_{\text{INT}} = 0.75 + 0.55 \text{PSE} + 0.34 \text{PRI} + 0.02 \text{PTR} + 0.08 \text{PUS} + 0.003 \text{PES} - 0.19 \text{PSR} + 0.16 \text{PEX} \quad \text{---(2)}
\]

Based on the standardized coefficients and the values of t-tests in Table 2 it can be stated that that within 7 independent variables, included in EQ2, only five predictors variables have a critical significant impact on the criterion variable \(Y_{\text{INT}}\).

Those variables are perceived security (Beta PSE = 0.532, \(p < 0.0000\)), perceived privacy (Beta PRI = 0.189 \(p < 0.0000\)), personal experience with Internet (Beta PEX = 0.177 \(p < 0.0000\)), perceived service response (Beta PSR = 0.152, \(p < 0.0000\)) and perceived usefulness (Beta PUS = 0.085 \(p < 0.0000\)), more specifically the perceived security was found to be the most important determinant of citizens’ intention to use public e-services (highest beta value and t-value). This findings is in practically agreement with that provided by other recent research (e.g. Carter et al., 2011), which concluded that the major concern of e-government users is the security issue.

### TABLE 1: SUMMARY OUTPUT OF THE MULTIPLE REGRESSION ANALYSIS

<table>
<thead>
<tr>
<th>Coefficients a</th>
<th>Symbols</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression Statistics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple correlation coefficient</td>
<td>Multiple R</td>
<td>0.94692078</td>
</tr>
<tr>
<td>Coefficient of determination R²</td>
<td></td>
<td>0.89665896</td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>Adjusted R²</td>
<td>0.89439837</td>
</tr>
<tr>
<td>Standard Error</td>
<td>SEE</td>
<td>0.69671758</td>
</tr>
<tr>
<td>Observations</td>
<td>N</td>
<td>328</td>
</tr>
<tr>
<td>ANOVA b</td>
<td>SS reg</td>
<td>1347.77683</td>
</tr>
</tbody>
</table>

### TABLE 2: VARIABLES INCLUDED IN THE RESEARCH MODEL EQUATION

<table>
<thead>
<tr>
<th>Factors</th>
<th>Regression Coefficients</th>
<th>Beta Coefficients</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Symbol</td>
<td>Value</td>
<td>Symbol</td>
</tr>
<tr>
<td>PSE</td>
<td>b_{PSE}</td>
<td>0.55220</td>
<td>B_{PSE}</td>
</tr>
<tr>
<td>PRI</td>
<td>b_{PRI}</td>
<td>0.34481</td>
<td>B_{PRI}</td>
</tr>
<tr>
<td>PTR</td>
<td>b_{PTR}</td>
<td>0.02676</td>
<td>B_{PTR}</td>
</tr>
<tr>
<td>PUS</td>
<td>b_{PUS}</td>
<td>0.08895</td>
<td>B_{PUS}</td>
</tr>
</tbody>
</table>
The results of testing Hypotheses 8 and 9:

Strong support was found for H₈ based on the results of Pearson correlation analysis summarized in table 3. A strong positive association is existed between to use public e-services and the usage of e-government application ($r = 0.816064636094511$), while the t statistic value ($t=25.49383023903$ at $p < 0.0000$ level) indicated that this relationship is highly statistically significant.

<table>
<thead>
<tr>
<th>Correlation between Yₙ and Xₙ</th>
<th>Correlation Coefficient</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r$</td>
<td>Value</td>
</tr>
<tr>
<td></td>
<td>0.8160646</td>
<td>25.49383023903</td>
</tr>
</tbody>
</table>

The descriptive analysis outputs in table 4 showed a very low level of using e-government application ($X\sim=1.1310975609756$, $S\sim=0.885428773406934$ and Skewness = $0.794237021564254$), a small percentage of citizens (16.77%) are regular users, while the large proportion is considered either non-users (52.44%) or irregular users (30.79%). As such, our results don’t support hypothesis H₉.

The graphical presentation in figure 1 clearly illustrates the findings discussed above; the values of the spider diagram strongly tend toward the left side, reflecting the low rate of e-government usage in the Egypt. Finally, the normal probability plot graph presented in figure 2 visually illustrates that the points form an approximate straight line, confirming that the empirical data is normally distributed and tends to cluster around the mean.

VII. CONCLUSION AND IMPLICATIONS

This paper has taken a further significant step in contributing to both theory and practice of e-government applications specifically in developing countries and to help address some gaps in the current body of literature, through expanding the research in this area by developing a comprehensive empirically-based model that identify and predict the critical factors that have the most significant influence on citizens’ intention to use public e-services, which have never been integrated before into one framework, to examination simultaneously for validation and relationship.

More specifically, this study has made a number of important practical implementations and theoretical contributions. In term of practical implications, the results...
presented in this paper can help government agencies to apply successful e-government applications, by formulating strategies addressing factors that essential in enhancing citizens’ intention to use public e-services and overcoming potential obstacles. To achieve these government agencies not only should focus on technology-related aspects of e-government application but more importantly place attention on the perceptual factors influencing citizens’ intention to use this application, particularly security issue, since different physical aspects are absent in electronic.

From an academic and research standpoint, this study provides empirical evidences and validation for the existing specialized literature concerning e-government. The findings of the empirical study provide support for the research model and for the hypotheses regarding the directional linkage among its variables. The high overall explanatory power of our model indicated that this model is capable of explaining high proportion of variance observed in e-shopping behavioural intention.

Furthermore, our research attempted to integrate and encompass the most frequently cited factors in the literature, and applied them in the local context in order to best examine the phenomenon. Therefore, the proposed model contained variables that have not been tested simultaneously in previous works.

VIII. LIMITATIONS AND FURTHER RESEARCH

Although this paper is differentiated from other previous work and expanded the research scope, as in any study, there are a few limitations that should be considered when interpreting the results and implications. First, the research model was validated using empirical data gathered from Egypt and therefore the findings may be specific to the culture in this developing country. Since the study is cross-sectional in design, a further examination of our argument using a longitudinal study is recommended in the future to investigate our model in different time periods. Also, the focus of the current study was on government to citizens (G2C) e-government application; hence, future studies should consider looking at the government to business (G2B) e-government application.

Apart from the above, we must point out that although the majority of the hypothesized relationships were validated, and significant, and the proposed model yielded a relatively high level of coefficient of multiple determination, multiple R-square (R2), there is still need to find additional variables, which may not be considered in our research model, to improve our ability to predict the future purchasing over the Internet.

However, there are other opportunities to build on this study in future research. Suggested areas include re-examining the proposed model in other countries with different cultures, and make comparisons, to see whether it can be applied. Also it would be valuable that future research use other theoretical bases or different methodologies and sample to derive predictions of citizens’ intention.

REFERENCES


