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**VOLUME 1**

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## Factors That Influence E-Government Adoption in Selected Districts of Tanzania

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**Abstract:** Purpose-Tanzania government has been making efforts to provide its information and services through internet. However, e-government adoption has been quite slow. Few publications explore e-government adoption in Tanzanian context; therefore, the purpose of this paper is to assess factors that influence citizen adoption of e-government in Tanzania. Design/methodology/approach- A survey was administered to elicit factors for e-government adoption in Tanzania. Findings- The results of multiple linear regressions indicate that social influence and system quality significantly influence e-government adoption in Tanzania. Research limitation/implications- In light of these findings, researchers should conduct a similar study using other different models of e-government adoption, in order to identify more factors that influence e-government adoption in Tanzania. Practical implications- Policy makers and e-government project teams should consider these factors to facilitate e-government adoption within the country.

**Keywords:** e-government adoption, e-government in Tanzania, citizen adoption.

### I INTRODUCTION

Tanzania is implementing different citizen-focused e-government plans and these are making the government more reachable, transparent, efficient, and effective in delivering public services (Yonazi 2010). Tanzania started implementing broad-based and cross-cutting public service reforms in the mid-1990's and these laid the foundations for the establishment of e-government in the country (Davison, Wagner & Ma 2005:295; Mutahagahywa, Kinyeki & Ulanga 2006:1). Thus, e-government is now one of the ten priority areas of the National ICT Policy of 2003 (URT 2003).

Despite the Tanzanian government's efforts to embark on the ICT usage, e-government adoption has been quite slow. The slow adoption of e-government limits people's access to relevant information in the country. Tanzania and its eastern-Africa neighbours were at the bottom of the United Nations' Global e-government readiness rankings, Tanzania was ranked number 143 out of the 182 surveyed countries (UN 2008). The poor ranking is a result of many factors, such as, the absence of electric power, low literacy level among potential users, limited technical expertise to support and maintain ICT infrastructure, poor telecommunication, and lack of computers (UN 2008). In addition, e-government policies and legislation in Tanzania face a number of challenges, including how to improve accessibility and affordability of public services to every citizen nationwide. Furthermore, the current legislation and policies have so far not enabled every Tanzanian to benefit from e-government. (Mayingu 2004; Mutagahywa, Kinyeki & Ulanga 2006:28).

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Regardless of slow adoption of e-government, there is little published research that explores e-government adoption based on citizen perspective (G2C). The purpose of this paper therefore, is to assess factors that influence citizen adoption of e-government in Tanzania. To pursue this line of inquiry, this research uses Davis (1989) model, Rogers (1995) model, DeLone and McLean (2003) model, Trustworthiness (Carter and Be'linger 2005) and the UTAUT model (Venkatesh *et al* 2003). The integration of models has not been done in the existing literature of e-government adoption in Tanzania. The study is original in that it involved Tanzanian citizens from Dar es Salaam, Morogoro and Iringa, thus representing urban, peri-urban and rural Tanzania regions, while most of e-government studies in Tanzania have concentrated on the public sector organisations (G2G) alone.

The paper is divided into four parts: the first part reviews the accumulated knowledge and available literature that is relevant to the topic and then several hypothesised relationships are formulated between e-government adoption and major independent variables. The second part presents the research methodology used in this work. The third part comprises of the research hypotheses testing and result. In this part, the data is analysed using factor analyses, linear regression and correlation analyses. The fourth part comprises of discussion of the findings. The final part consists of the conclusions and recommendations.

## 1.0 Theoretical framework, Literature review and hypotheses

The following sections discuss the literature of the factors that were drawn from theoretical framework of this study. The hypotheses were also proposed in this section.

### 1.1 Theoretical framework

The conceptual framework of this study addresses the key factors related to e-government adoption. The proposed model and theories follows the TAM and explains the intention towards the actual use of e-government website with perceived usefulness and perceived ease of use as e-government adoption determinants (Davis 1989). Rogers (1995) model was used to measure relative advantage, compatibility, social influence and image. DeLone and MacLean (2003) model was used to measure quality aspects of government websites, net benefit and user satisfaction, trustworthiness (Carter & Be'linger 2005) and social influence (Venkatesh *et al* 2003).

### 1.2 Literature review

In this section, key factors to e-government adoption were reviewed to enable hypotheses formulation.

#### 1.2.1 User satisfaction

DeLone and McLean (2003) created a comprehensive model containing six constructs, which have effects on the success of information systems: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. Conrath and Mignen (1990) asserted that in order for e-government adoption to succeed, a high level of satisfaction with the online service provided by the government is required. Furthermore, Conrath and Mignen (1990) argue that by measuring user satisfaction it will have an immediate, meaningful and objective feedback about user's reference and expectation. In addition, Yaghoubi, Haghi and Asl (2011) supported that e-government performance will be evaluated in relation to set of satisfaction dimensions that indicate the strong and the weak factors affecting user satisfaction of e-government service. Thus, the following hypothesis is proposed:

**H1a: There is a significant relationship between e-government adoption and user satisfaction**

**H1b: There will be positive relationship between e-government adoption and user satisfaction**

#### 1.2.2 Social influence

Social influence is defined as the degree to which peers influence use of a system. Whether this is positive or negative; it is a very important factor in many aspects of the lives of citizens and is likely to be influential (Venkatesh *et al*, 2003). Relevant references, such as citizen's family, colleagues and friends may have an influence on citizens' decisions (Irani *et al*, 2008; Tan & Teo 2000). The findings

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of many scholars like Rogers (1995), Taylor and Todd (1995), and Pavlou and Fygenson (2006) suggest that social influences are an important determinant of behaviour. Thus, the following hypothesis is proposed:

**H2a: There is a significant relationship between social influence and e-government adoption in Tanzania**

**H2b: There would be a positive relationship between social influence and e-government adoption**

### 1.2.3 Compatibility

Compatibility can take on a very broad meaning. Moore and Benbasat (1991) introduced the concept of work practice compatibility. Work practice compatibility can be further refined into task compatibility, workflow compatibility and professional compatibility (Tulu, Horan & Hurkhard 2005). Karahanna, Agarwal and Angst (2006) also defined various forms of compatibility such as compatibility with values, past experience, current practices and preferred practices. In the context of this research, compatibility is defined as a citizen's belief that e-government fits the way one works and lives (Rogers 1995). If citizens find e-government services compatible, then it is likely that they will want to use it. This led to the following hypotheses:

**H3a: There is a significant relationship between perceived compatibility and e-government adoption in Tanzania**

**H3b: Higher levels of perceived compatibility will be positively related to higher levels of intention to use a state e-government service.**

### Perceived ease of use (PEOU) and perceived usefulness (PU)

Perceived usefulness was originally defined by Davis as the belief that using a particular system would enhance one's job performance (Davis 1989). Perceived ease of use refers to one's perceptions of the amount of effort required to use the system. The model predicts that higher perceptions of usefulness and ease of use will increase intention to use a system (Davis 1989). This led to the following hypotheses:

**H4a: There is a significant relationship between perceived usefulness and e-government adoption**

**H4b: Higher levels of perceived usefulness will be positively related to higher levels e-government adoption**

**H4c: There is a significant relationship between perceived ease of use and e-government adoption**

**H4d: Higher levels of perceived ease of use will be positively related to higher levels of e-government adoption.**

### 1.2.4 Trust

Trust is the belief that the other party will behave as expected in a socially responsible manner, and in doing so, it will fulfil the trusting party's expectations (Gefen 2000, Lewis & Weigert 1985, Luhmann 1979). Trust is crucial in economic transactions because it reduces the risk of falling victim to opportunistic behaviour (Fukuyama 1995; Williamson 1985). Perceptions of trustworthiness could also influence citizens' intention to use state e-government services (Carter & Bélanger 2005). Thus, it should be imperative to establish citizen trust in e-government if it is to succeed (Fukuyama 1995). From these discussions, the following hypotheses were formulated:

**H5a: There is a significant relationship between perceived trust and e-government adoption in Tanzania.**

**H5b: Higher levels of trust in the government will be positively related to e-government adoption.**

### 1.2.5 Website quality

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Aladwani and Palvia (2002) defined web quality as a user's positive evaluation of website's features, ensuring it meets the user's needs and reflects the overall excellence of the website. Therefore, they identified three dimensions of web quality: technical adequacy, web content, and web appearance. Moreover, Zhong and Ying (2008) stated that website quality includes the features of the website system, which present measures of quality such as system, information, and service quality. In the website quality literature, several researchers have declared that website quality include multiple dimensions, such as information quality, system quality, security, ease of use, user satisfaction, and service quality (Aladwani & Palvia 2002; DeLone & McLean 2003; Hoffman & Novak 2009; Urban, Cinda & Antonio 2009). Furthermore, Floh and Treiblmaier (2006) emphasized that website quality, which include web design, structure and content, is an important factor for achieving customer satisfaction. Schupp, Fan & Belanger (2006) conducted a survey to investigate the impact of information quality and system quality on website satisfaction. The results showed that information quality and system quality were significant predictors of website satisfaction, and, therefore, intention to use the website. In addition, Li and Jiao (2008) confirmed that there is a significant relationship between website quality and user satisfaction and that this relationship affects the actual use of online services. Thus, the following hypotheses were proposed:

**H6a:** *There is a significant relationship between information quality and e-government adoption in Tanzania*

**H6b:** *Higher level of information quality will be positively related to e-government adoption*

**H6c:** *There is a significant relationship between system quality and e-government adoption in Tanzania*

**H6d:** *Higher level of system quality will be positively related to e-government adoption*

#### 1.2.6 Relative advantage

According to Rogers (1995), relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. When e-government is used it contributes to valuable promotions of the company; enhance the quality and speed of customer services; create competitive advantages; entice shoppers and encourage customer interaction; support core business functions that are integral to business strategy; and provide new business opportunities by increasing market presence and facilitating online purchasing (Drinjak, Altman & Phil 2001). According to Polatoglu and Ekin (2001) and Tan and Teo (2000), these advantages may have an effect on individuals' adoption decisions. Agarwal and Prasad (1997) found that there is no significant relationship between adoption of online services and its relative advantages. From the above debate, it is apparent that an individual, who perceives online services as a useful innovation, would be likely to adopt the online service. This led to the following hypothesis:

**H7a** *There is a significant relationship between e-government adoption and its relative advantage*

**H7b** *Higher levels of perceived relative advantage will be positively related to e-government adoption*

#### 1.2.7 Image

Image construct is defined as the degree to which an individual believes that the adoption of an innovation will bestow him with added prestige in his relevant (Plouffe, Hulland & Vanderbosch 2002). Moore and Benbasat (1991) present image, as a factor that influences the acceptance and use of an innovation. In contrast to this observation, Carter and Belanger (2005) suggested that higher levels of perceived image do not directly affect citizen's intentions to use e-government services. This is also consistent with previous work where image was not a good predictor of e-commerce use intention when compared to the other diffusion of innovation constructs (Van Slyke, Belanger & Comunale 2004). From the above debate, it is apparent that perceived image does not affect e-government adoption. Thus, the following hypothesis was formulated:

**H8a:** *There is a significant relationship between perceived image and e-government adoption*

**H8b:** *Higher levels of perceived image will be positively related to higher levels of e-government adoption*

## 2 Methodology

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To test the proposed model for this study, a questionnaire was designed to gather the necessary information. The questionnaire was composed of unambiguous and easy questions for respondents to complete. This questionnaire draft was pre-tested using convenience sampling in order to increase the reliability and validity of the findings.

### 2.1 Sample size and questionnaire administration

Purposive sampling was used to select regions, districts, wards and participants involved in the study. This study used the non-probability method, which is also referred as quota sampling (Picard 2007: 63). Quota sampling is based on the researcher ease of access to the sample. With this method, a required percentage of the total research population is identified (the quota) with some visible characteristics that are used to guide the sample and then the researcher takes up a position in a convenient location and asks all possible participants who pass to be involved in the research.

Quota sampling method was used in this study due to the following reasons; it was not possible to get a list of households and participants in advance, limited budget, and financial constraints. Additionally, it was difficult to use probability sampling methods due to the fact that Tanzania does not have a systematic arrangement of habitation (Nchimbi 2002). Therefore, it was not possible to sample households and participants using simple random approach.

Participants were drawn in each of the three wards in each district. Based on the criteria of high, medium and low concentration of households the selection of households was done as follows: In Kinondoni district, participants were obtained at a sampling interval of one in every ten households. In Morogoro town district, participants were obtained at a sampling interval of one in every five households and in Njombe district; participants were obtained at a sampling frame of one in every three households. In the households, participants were purposively selected based on their position in the house, age and gender. The study strived to have an equal representation of men, women, young and the elderly.

Regions, districts and wards were selected purposively based on accessibility by roads; presence of public access ICTs such as telecentres, internet cafes; a diverse combination of urban area, peri-urban area and rural areas, geographical location and economic activities taking place in these regions. Onwuegbuzie and Leech (2005: 280-281) view purposive sampling as belonging to quantitative approach due to the fact that it can be used to generalize the findings. The selection of urban, peri-urban and remote regions means that a representation of the whole country was assured.

### 2.2 Response rate

The questionnaire was administered to 450 citizens in the three Tanzanian districts. After eliminating incomplete responses, 448 usable responses were retained.

### 3.0 Research hypotheses testing and findings

This section demonstrates the results of factor analysis of quality, trust, satisfaction, intention to use, relative advantage, image, compatibility, perceived ease of use, perceived usefulness and social influence. These factors were used as independent variables in the subsequent analysis. This study assessed the internal consistency of the entire scale with the use of Cronbach's Alpha (Hair et al. 2006). Furthermore, Factor Analysis was employed for the validation of the model. A multiple linear regression analysis was performed to assess the relationship between the independent variables (quality, trust, satisfaction, intention to use, relative advantage, image, compatibility, perceived ease of use, perceived usefulness and social influence) with the dependent variable e-government adoption (net benefit).

#### 3.1 Quality

Sixteen items were used to measure quality. Table 1-1 shows the correlation matrix of the scale used to measure quality. All the items are strongly correlated and are significant at the 0.01 level. The result of KMO measure of sampling adequacy was 0.901, which is good for factor analysis. The Bartlett's test of Sphericity was found to be significant at 0.000.

Table 1-1 Correlation among the items used to measure quality

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501a	1															
501b	.872**	1														
501c	.724**	.805**	1													
501d	.711**	.758**	.815**	1												
501e	.316**	.324**	.361**	.436**	1											
502a	.280**	.308**	.301**	.333**	.205**	1										
502b	.328**	.378**	.366**	.404**	.230**	.864**	1									
502c	.255**	.281**	.265**	.325**	.208**	.792**	.822**	1								
502d	.382**	.438**	.353**	.389**	.239**	.669**	.718**	.698**	1							
502e	.373**	.398**	.353**	.425**	.249**	.657**	.647**	.642**	.717**	1						
502f	.349**	.359**	.356**	.392**	.246**	.670**	.659**	.624**	.620**	.706**	1					
503a	.344**	.347**	.385**	.380**	.271**	.587**	.624**	.577**	.531**	.635**	.698**	1				
503b	.428**	.458**	.478**	.477**	.296**	.548**	.622**	.563**	.534**	.582**	.655**	.782**	1			
503c	.369**	.383**	.430**	.469**	.318**	.524**	.551**	.552**	.514**	.580**	.635**	.774**	.864**	1		
503d	.243**	.259**	.356**	.381**	.263**	.452**	.466**	.467**	.455**	.452**	.478**	.589**	.632**	.710**	1	
503e	.234**	.246**	.338**	.377**	.280**	.428**	.464**	.495**	.422**	.455**	.508**	.632**	.625**	.681**	.832**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 1-2, factor analysis of the items suggests a three factor solution which was labelled qual\_1, qual\_2 and qual\_3. Item 501e was not included in the constructs because its factor loading was less than 0.5. The Cronbach's alpha for the entire scale was found to be 0.773, which indicates that internal consistency was high.

**Table 1-2 Factor analysis of quality**

Items	Components		
	1	2	3
502a accuracy: the website provides accurate information	.871	.106	.199
502b reliability: the website provides reliable information	.867	.174	.240
502c relevance: the website provides relevant information	.845	.048	.255
502d easiness: the website provides easy to understand information	.783	.249	.182
502e the information provided by this website is in useful format	.748	.228	.281
502f information provided by this website meets my needs	.703	.177	.390
501b the government website is easy to learn	.211	.914	.058
501a the government website is easy to use	.189	.889	.059
501c I find it easy to get this website to do what I want it to do	.133	.867	.219
501d using government website does not require a lot of efforts	.190	.837	.238
501e using government website is not often frustrating	.031	.403	.321
503e the government website is designed to satisfy the needs of citizens	.253	.098	.856
503d the government website is designed with citizen best interest at heart	.227	.126	.842
503c the government website gives prompt services to citizens	.383	.254	.779

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Items	Components		
503b the government website provides services at the times it promises	.434	.311	.685
503a the government website provides reliable services	.516	.194	.655

### 3.2 Trust

Seven items were used to measure trust. Table 1-3 shows the correlation matrix for the seven items used to measure trust. The correlation table shows that all of the correlations are significant at the 0.01 level. Factor analysis can be done on the items since the items are correlated.

**Table 1-3 Correlations among the items used to measure trust**

	504a	504b	504c	504d	505a	505b	505c	506a
<b>504a</b>	1							
<b>504b</b>	.830**	1						
<b>504c</b>	.820**	.880**	1					
<b>504d</b>	.759**	.856**	.887**	1				
<b>505a</b>	.479**	.500**	.505**	.572**	1			
<b>505b</b>	.469**	.509**	.488**	.507**	.796**	1		
<b>505c</b>	.444**	.467**	.452**	.492**	.749**	.882**	1	
<b>506a</b>	.413**	.473**	.464**	.491**	.460**	.475**	.489**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The factor analysis results indicate that the items are valid, as the KMO measure is 0.852 and Bartlett's Test of Sphericity was significant (0.000). Factor analysis led to two factors, and all the items had a significant loading (Table 1-4). The first factor was labelled trus\_1 and the second factor was labelled trus\_2. The Cronbach alpha for the entire scale was found to be 0.876, which shows that the internal consistency was high.

**Table 1-4 Factor analysis of trust**

Item	Component	
	1	2
<b>504c</b>	.920	.253
<b>504b</b>	.908	.267
<b>504a</b>	.879	.258
<b>504d</b>	.877	.317
<b>505b</b>	.266	.923
<b>505c</b>	.232	.915
<b>505a</b>	.327	.841

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### 3.3 Satisfaction

Seven items were used to measure satisfaction (question 506). Table 1-5 shows the correlation matrix for the seven items used to measure satisfaction. The correlation table shows that all of the correlations are significant at the 0.01 level. Factor analysis can be done on the items since the items are correlated.

**Table 1-5 Correlations among the items used to measure satisfaction**

	506a	506b	506c	506d	506e	506f	506g
506a	1						
506b	.872**	1					
506c	.646**	.703**	1				
506d	.604**	.591**	.800**	1			
506e	.572**	.579**	.480**	.499**	1		
506f	.510**	.542**	.337**	.328**	.703**	1	
506g	.521**	.521**	.376**	.389**	.695**	.748**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The factor analysis results indicate that the items are valid, as the KMO measure is 0.812 and the Bartlett Test of Sphericity is significant at 0.000. Factor analysis led to two factors, and all the items had a significant loading as it can be observed in Table 1-6. The factors are labelled Satis\_1 and Satis\_2. The Cronbach alpha for the entire scale was found to be 0.738 which shows the internal consistency is high.

**Table 1-6 Factor analysis of satisfaction**

Item	Component	
	1	2
My overall satisfaction level with regard to the internet is better than I expected	.912	.165
The overall quality of the internet is better than I thought it would be	.875	.167
Using internet to obtain government information is effective to accomplish my purpose	.761	.457
Using the internet to obtain government information is adequate to accomplish my purpose	.743	.463
I will continue accessing government information on the internet even if others in my community do not	.179	.907
I prefer accessing government information from the internet when I need government services	.232	.869
I will recommend the website that provides government information to friends/colleagues/family	.377	.789

### 3.4 Intention to use

Four items were used to measure intention to use. Table 1-7 shows the correlation matrix of the scale used to measure intention to use. All the items are strongly correlated and significant at the 0.01 level. The result of KMO measure of sampling adequacy was 0.737, which is good for factor analysis. The Bartlett's Test of Sphericity was found to be significant at 0.000.

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**Table 1-7 Correlations among the items used to measure intention to use**

	507a	507b	507c	507d
507a	1			
507b	.515**	1		
507c	.854**	.661**	1	
507d	.698**	.519**	.663**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

As displayed in Table 1-8, the entire load is on one factor, which is labelled int\_us1. The internal consistency of scores on the four items is good, with Cronbach alpha at 0.860. This suggests that these items can be used together to create a composite variable for the intention to use factor.

**Table 1-8 Factor analysis of intention to use**

Item	Component
	1
I intend to increase my use of an internet to access government information in the future	.930
I intend to continue using internet to access government information in the future	.900
I will continue using internet to access government information in the future	.834
I will regularly use internet to access government information in the future	.766

### 3.5 Relative advantage

Four items were used to measure relative advantage. Table 1-9 shows the correlation matrix of the scale used to measure relative advantage. All the items are strongly correlated and significant at 0.01 level.

**Table 1-9 Correlations among items used to measure relative advantage**

	508a	508b	508c	508d
508a	1			
508b	.669**	1		
508c	.611**	.686**	1	
508d	.480**	.503**	.519**	1

The results of KMO measure of sampling adequacy was 0.803, which can be used for factor analysis. The Bartlett's Test of Sphericity was found to be significant at 0.000. As displayed in Table 1-10, the entire load is on one factor. The internal consistency of scores on the four items is good, with Cronbach alpha at 0.847. This suggests that the items can be used together to create a composite variable for the relative advantage factor and is labelled rel\_ad1.

**Table 1-10 Factor analysis of relative advantage**

Item	Component
Internet enables me to meet my government information needs	.883
Internet offers me personalized government services	.856
Using internet to access government information enabled me to better manage my daily activities	.842
Using internet enables me to have access to timely government information and services	.729

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### 3.6 Image

Five items were used to measure the image factor. The KMO measure of sampling adequacy was 0.698, which is sufficient for factor analysis. The Bartlett's Test of Sphericity is significant at 0.000. The correlations are significant at 0.01 level as indicated in Table 1-11.

**Table 1-11 Correlations among the items used to measure image**

	509a	509b	509c	509d	509e
509a	1				
509b	.701**	1			
509c	.702**	.706**	1		
509d	.104	.084	.031	1	
509e	.161**	.260**	.160**	.454**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The factor analysis led to two factors, and all items had a significant loading as indicated in Table 1-12. The first factor is labelled imag\_1 and the second is labelled as imag\_2. The items had internal consistency with Cronbach alpha at 0.717, which indicates inter-relatedness between the items. After factor analysis, the value of alpha dropped to 0.257. This could be due to low number of questions. The items would be discarded if a low Cronbach alpha is due to poor correlation between items.

**Table 1-12 Factor analysis of image**

	Component	
	1	2
People who use internet to obtain government information are trendy	.899	.018
Using internet to obtain government information improves my image	.885	.090
People who use the internet to obtain government information are IT savvy	.884	.145
Only young people use internet to obtain government information	-.001	.864
People who use internet to obtain government information have more prestige	.166	.832

### 3.7 Compatibility

Four items were used to measure compatibility. Table 1-13 shows the correlation matrix of the scale used to measure compatibility. All the items are strongly correlated and significant at the 0.01 level.

**Table 1-13 Correlations among the items used to measure compatibility**

	510a	510b	510c	510d
510a	1			
510b	.885**	1		
510c	.738**	.794**	1	
510d	.775**	.824**	.776**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

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The result of KMO measure of sampling adequacy was 0.835 which is good for factor analysis and the Bartlett’s Test of Sphericity was found to be significant at 0.000. As displayed in Table 1-14 the factor analysis results led to one factor. The Crobach’s alpha for the entire scale was found to be very high (0.941). These results suggest that these items can be used together to create a composite variable for compatibility factor. The items in this factor are labelled as Comp\_ty.

**Table 1-14 Factor analysis of compatibility**

Item	Component
	1
I think that using internet to obtain government information fits well with the way I live my life	.951
Using internet fits well with my lifestyle	.923
Using internet is compatible with all aspect of my life	.915
Using internet to access government information is completely compatible with my current situation	.898

### 3.8 Perceived ease of use

Three items were used to measure perceived ease of use. Table 1-15 shows the correlation matrix of the scale used to measure perceived ease of use. All the items are strongly correlated and are significant at 0.01 level.

**Table 1-15 Correlations among the items used to measure perceived ease of use**

	511a	511b	511c
511a	1		
511b	.419**	1	
511c	.753**	.507**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

KMO measure of sampling adequacy was 0.631 and the Bartlett’s Test of Sphericity was significant at 0.000. These values allow factor analysis. As displayed in Table 1-16 the entire load is on one factor and is labelled peaou. The Crobach’s alpha for the entire scale was found to be 0.788, which means that the internal consistency of the items is good.

**Table 1-16 Factor analysis of perceived ease of use**

Item	Component
Navigation: it is easy to navigate around the government website	.911
Usability: it is easy to use internet to obtain government information and service	.876
Accessibility: the government websites provides access for persons with disabilities	.732

### 3.9 Perceived usefulness

Five items were used to measure perceived usefulness. Table 1-17 shows the correlation matrix of the scale used to measure perceived usefulness. All the items are strongly correlated and significant at 0.01 level.

**Table 1-17 Correlations among items used to measure perceived usefulness**

	512a	512b	512c	512d	512e
512a	1				
512b	.764**	1			
512c	.519**	.610**	1		

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512d	.535**	.565**	.735**	1
512e	.466**	.492**	.421**	.525**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The result of KMO sampling adequacy was 0.792 which is good for factor analysis and the Bartlett’s Test of Sphericity was found to be significant at 0.000. The results of factor analysis reveal that all the items loaded in one factor, which was labelled as PU (Table 1-18). The Crobach’s alpha for the entire scale was found to be 0.869, which indicates high internal consistency of the items.

**Table 1-18 Factor analysis of perceived usefulness**

Item	Component
Timeliness: usually the government information from the government website is up-to-date	.866
Accountability: I am able to communicate with government officials through the government website/email/internet	.838
Content: the website provide the precise government information I need	.824
Transparency: the government website enable me to actively give my opinion to the government	.821
Pricing: I save money and time when using information from the government website	.699

### 3.10 Social influence

Six items were used to measure social influence (question 513). Table 1-19 shows the correlation matrix for the six items used to measure social influence. The correlation table shows that all the correlations are significant at 0.01 level. Factor analysis can be carried out as the items are correlated.

**Table 1-19 Correlations of the items used to measure social influence**

	513a	513b	513c	513d	513e	513f
513a	1					
513b	.828**	1				
513c	.822**	.832**	1			
513d	.805**	.826**	.919**	1		
513e	.725**	.755**	.778**	.780**	1	
513f	.711**	.715**	.756**	.769**	.770**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The factor analysis results indicate that the items are valid, as the KMO measure is 0.914 and the Bartlett’s Test of Sphericity is significant at 0.000. All the factors loaded together to produce one factor, which was labelled as soc\_inf (Table 1-20). The internal consistency of scores on the six items is very high, with Crobach alpha at 0.957. This suggests that these items can be used together to create a composite variable for the social influence factor.

**Table 1-20 Factor analysis of social influence**

Item	Component
If your family would look favourably on you for accessing information on the internet	.943
If your friends would look favourably on you for accessing government information on the	.938

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Item	Component
internet	
If your leader from local government access government information on the internet	.912
If your close friend access government information on the internet	.905
If it is a culture in my community to access government information on the internet	.884
My decision to access, (or not to access) government information on the internet is influenced by my family/friends	.866

### 3.11 Net benefit

Net benefit was measured by twelve (12) items (question 514). Table 1-21 shows the correlation matrix for the twelve items as designed in the questionnaire. All items are strongly correlated at 0.01 level of significance, which gives a strong base to continue with factor analysis.

**Table 1-21 Correlation among the items used to measure net benefit**

514a	514b	514c	514d	514e	514f	514g	514h	514i	514j	514k	514l
1											
.459**	1										
.740**	.589**	1									
.694**	.428**	.786**	1								
.725**	.311**	.629**	.747**	1							
.278**	.631**	.427**	.306**	.306**	1						
.375**	.493**	.458**	.441**	.363**	.590**	1					
.143*	.473**	.262**	.172**	.069	.613**	.628**	1				
.501**	.499**	.552**	.461**	.393**	.590**	.612**	.601**	1			
.222**	.415**	.370**	.336**	.248**	.521**	.521**	.470**	.552**	1		
.432**	.402**	.496**	.474**	.426**	.422**	.429**	.349**	.517**	.548**	1	
.009	.286**	.118*	.096	.010	.443**	.332**	.484**	.349**	.378**	.291**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Before proceeding with factor analysis the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test were conducted to determine whether or not it was appropriate to conduct factor analysis. The determined KMO measure of sampling adequacy was 0.872. The Bartlett' test of Sphericity was found to be significant (0.000). The results suggested that the data could support factor analysis. Crobach's alpha was calculated among the twelve set of variables used in the factor analysis to determine the reliability of those questions for measuring a single construct. The value of Crobach alpha was 0.898 hence good internal consistency of the scores for

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the twelve items. This is due to the fact that the level of alpha that indicates an acceptable level of reliability is 0.70 or higher. The factor analysis results are presented in Table 1-22.

**Table 1-22 Factor analysis of net benefit**

Item	Component	
	1	2
Increased income	.850	.003
Accessed new and better markets	.796	.245
Job opportunities	.703	.219
Access to medical services	.701	-.172
Improved living standards	.701	.359
New and better opportunities	.692	.450
Business improved or expanded	.613	.444
Access to educational opportunities	.504	.453
Make rational decision and take appropriate actions	.103	.876
Improvement in skills	.168	.867
Improved in awareness of government services	.043	.864
Easy coordination of activities	.309	.835

As noted from Table 1-22, the exploratory factor analysis yielded two constructs from the twelve items. The factor loadings of the items ranged from 0.5 to 0.9. The weight of all the factor items is not less than 0.5. These factors are listed as ne\_1 and ne\_2.

### 3.12 Linear regression

Multiple linear regression was then performed on the factors which were validated using factor analysis in order to test the hypothesis as indicated in Table 1-23 below.

**Table 1-23 Linear regression for factors influencing e-government adoption**

	Coefficients	Std. Error	T	Sig.
(Constant)	1.831	.370		
inf_q1	-.033	.086	-.384	.701
syst_q2	-.244	.086	-2.837	.005
trus_1	.116	.076	1.532	.127
trus_2	.128	.088	1.450	.148
satis_1	.049	.077	.640	.523
satis_2	.079	.085	.933	.352
int_us1	-.206	.075	-2.748	.006
rel_ad1	.004	.069	.054	.957
imag_1	.098	.063	1.561	.120
imag_2	.083	.055	1.493	.137
comp_ty	.040	.054	.750	.454
Peaou	-.002	.073	-.023	.982
Pu	.051	.075	.674	.501
soc_inf	.123	.046	2.694	.008

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## 4.0 Discussion

This paper discussed the results of a survey targeted towards e-government adoption in Tanzania. The significant and non-significant factors found in the study and their influences on practice are outlined below.

### 4.1 Significant results

Of the adoption factors (Table 1-23), only social influence and system quality had a significant impact on e-government adoption in Tanzania as discussed below:

#### 4.1.1 Social influence

H2a and H2b are supported. This means that social influence had a significant positive relationship with e-government adoption. This implies that e-government adopters were influenced by positive messages from their social networks, hence a strong behavioural intention to adopt the e-government systems. Other scholars concur with this finding as noted in their postulations that social influences are an important determinant of behaviour (Rogers 1995). These findings may also be viewed in the light of previous research. For example, Gupta, Dasgupta and Gupta (2008) and Al-Shafi and Weerakkody (2010) explored the adoption of e-government in Qatar and found that social influence determine citizens' use of e-government.

#### 4.1.2 System quality

H6c was supported, and H6d was rejected. This means that system quality is significantly related to e-government adoption negatively. This means that low system quality hinders access to e-government system. Schaupp, Fan and Belanger (2006) also support that system quality is a significant predictor of website satisfaction, and, therefore, intention to use the website. In addition, Li and Jiao (2008) confirmed that there is a significant relationship between website quality and user satisfaction and that this relationship affects the actual use of online services.

### 4.2 Non-significant factors

It is often interesting to evaluate not only significant results, but also unexpected results, especially in a relatively new field, such as e-government (Carter & Belanger 2004). Compatibility, trust, relative advantage, perceived ease of use, perceived usefulness, satisfaction, information quality and image were found to be insignificant in terms of explaining factors that influence access to e-government information and e-government adoption in Tanzania. An interpretation of these results is presented below.

#### 4.2.1 Information quality

H6a and H6b were rejected. This means that e-government adoption had a negative relationship with information quality hence a barrier to e-government adoption. However, this relationship is not significant.

#### 4.2.2 Compatibility

H3a was rejected, and H3b was supported. This means that citizens may have higher intentions to use e-government services than those who view these services as incompatible with their lifestyles. Surprisingly, the strength of this relationship is not statistically significant, which means that compatibility does not matter in explaining e-government adoption in Tanzania. On the contrary, Karahanna, Agarwal & Angst (2006) are of the opinion that higher levels of perceived compatibility are associated with increased intentions to adopt e-government.

#### 4.2.3 Trust

H5a was rejected and H5b was supported. This means that, trust was positively related to e-government use, but the association with e-government adoption was not significant. These findings contradict the findings of previous studies, which argue that trust should be imperative to establish citizen trust in e-government if it is to succeed (Fukuyama 1995). In the Tanzanian context, the trust factor

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cannot be used to explain e-government adoption. However, these findings are consistent with the research findings by Carter and Belanger (2004) who reported that trust in e-government does not have a direct effect on the use of e-government. Trust in the government does not have a direct effect on intention to use state e-government services. Citizens frequently interact with the government agencies to seek government information and services, such as the processing of admission for universities, to seek information about national examination results, etc. These activities must be completed regardless of the level of trust an individual has in the government.

#### 4.2.4 Relative advantage

H7a was rejected and H7b was supported. This means that relative advantage is not significantly related to e-government adoption, although their relationship was positive. According to Rogers (1995), relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. The use of e-government contributes to valuable promotions of the company; enhances the quality and speed of customer services; creates competitive advantages; entices shoppers and encourages customer interaction; supports core business functions that are integral to business strategy; and provides new business opportunities by increasing market presence and facilitating online purchasing (Drinjak, Altmann & Phil 2001; Polatoglu & Ekin 2001; Tan & Teo 2000). According to Polatoglu & Ekin (2001) and Tan & Teo (2000), these advantages may have an effect on individuals' adoption decisions. However, it was surprising to find in this study that relative advantage is a non-significant predictor of e-government adoption. This study is in line with Agarwal and Prasad (1997) who found that there is no significant relationship between adoptions of online services and its relative advantages. This is probably because of a desire to adopt new technologies born out of curiosity about innovation rather than benefits innovation might offer.

#### 4.2.5 Perceived ease of use (PEOU) and perceived usefulness (PU)

H4c, H4d, H4a were rejected while H4b was supported. This means that PEOU and PU are not significantly related to e-government adoption. PEOU had a negative relationship with e-government adoption while PU had a positive relationship with e-government adoption. Perceived usefulness was originally defined as the belief that using a particular system would enhance one's job performance (Davis 1989). Perceived ease of use refers to one's perceptions of the amount of effort required to use the system. In contrast to the finding of this study, Davis (1989) model predicts that higher perceptions of usefulness and ease of use will increase intention to use a system (Davis 1989).

In addition, Lin, Fofana & Liang (2011) assessed citizen adoption in Gambia and their findings indicated that perceived ease of use significantly affect citizen's attitude to use the e-government systems. However, Gambias perceived usefulness was found to have a weak link intention to use e-government systems. In this study, it was found that perceived usefulness had a positive relationship with e-government adoption. This means that perceived usefulness enhances e-government adoption. In contrast, perceived ease of use, as appears in Table 1-23, had a negative relationship with e-government adoption. However, these factors are not significant meaning that they cannot be used to explain e-government adoption in Tanzania.

#### 4.2.6 User satisfaction

H1a was rejected and H1b was supported. This means that user satisfaction is positively related to e-government adoption, but their relationship was not significant. Previous studies suggest that e-government performance will be evaluated in relation to a set of satisfaction dimensions that indicate the strong and the weak factors affecting user satisfaction of e-government service (Conrath & Mignen 1990; DeLone & McLean 2003; Yaghoubi, Haghi & Asl 2011). Surprisingly, this study found that satisfaction is positively related to e-government adoption, but this factor cannot be used to explain e-government adoption in Tanzania.

#### 4.2.7 Image

H8a was rejected and H8b was supported. This means that image is not significant in determining e-government adoption in Tanzania. Although the analysis carried out in Table 1-23 showed that image is positively related to e-government; it did not play a role in influencing the dependent variable in this study. This result is in line with Carter and Belanger (2005), who suggested that higher levels of perceived image do not directly affect citizens' intentions to use e-government services. Image is insignificant probably because of the collectivistic culture of the country where this study is conducted (Hofstede 1993). In a collectivistic society, people

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might consider too much differentiation and rewards for any reason as inimical to the fundamental goal of maintaining harmony in groups (Yamaguchi 1993). There may be little incentive in trying to gain high prestige, which would make one distinctive from the rest. Thus regardless of whether the use of the service can bestow higher image, the senior citizens' perception of the service will not be significantly affected.

## 5.0 Conclusion and recommendations

Social influence and system quality was found to significantly influence e-government adoption in Tanzania. However, satisfaction, compatibility, perceived usefulness, trust, information quality, relative advantage, and image were found to be insignificant in terms of explaining e-government adoption in Tanzania. Furthermore, it can be concluded that this study extends the theoretical knowledge in the area of citizens' adoption of technology (in this case, e-government applications and services) by testing a combination of models in the Tanzania context.

It is therefore recommended that a similar study (e-government adoption G2C) be conducted using different models of e-government adoption, in order to identify more factors, which influence the adoption of e-government in Tanzania.

The study has implications to policy makers and to e-government project teams in Tanzania. Policy makers should consider e-government adoption barriers in order to formulate policies of eliminating them. Likewise, e-government project teams should consider these barriers in order to overcome them before the implementation of e-government systems. Moreover, factors identified as enhancing ones require attention in order to encourage further adoption and usage of e-government within the country.

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## Information Technologies and its Impact on the Organisational Structure

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**Abstract:** *Neither Information technologies determine organisational structure merely, nor does organisational structure. There is a mutual interaction between these variables. Using information technologies is a must for the organisations in this century. However how information technologies evolved over the time brings a question of what effect can technology bring towards organisations and their structure. This study discusses the conceptual issues that raise the importance of technological tools, views and ways that followed by organisations and changed over the time. It also examines technological, organisational and interactive ties that connect organisational structure and the information technology. It concludes that information technologies have an impact on the organisational structure via centralisation and decentralisation, authority and control, space of control, change in organisational level, departmental structure, decision making process, communication, and organising the work.*

**Keywords:** Technology, Information Technologies, Organisational Structure

### I. INTRODUCTION

It goes without saying that current century underlines how important is the effect of globalisation on a highly competitive business environment. Many discussions are considered under the influence of the booming technological innovations and accordingly growing demand for better organisational structures. Organisations in current world, it is vital to gain the desired information internally and externally and use them in order to maximise efficiency. There is no doubt that a balanced coordination and very open communication channels between the units and groups in the organisations help to stimulate this efficiency. Therefore making use of information and the communication with the IT as a combining tool and sharing its outcomes will set the stage for very productive organisations. In recent knowledge societies, it is a must to provide transfers for corporate information to create ideal organisational structure. This

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can mainly be provided by moving learning from a narrow perspective to spread and share the information through the organisation. Transferring corporate information can support corporate communication and encourage coordination within the organization.

The objective of the current study is to review the technological, organizational and interactive ties that connect organisational structure and the information technology. Therefore, this study is organized as follows. First, the concepts of information technology and organizational structure will be introduced and discussed. Following this discussion, the impact of information technologies on organizational structure will be articulated in terms of centralisation and decentralisation, authority and control, space of control, change in organisational level, departmental structure, decision making process, communication, and organising the work.

## II. INFORMATION TECHNOLOGY AND ORGANISATIONAL STRUCTURE

This section provides information with respect to the information technology, organizational structure, and the interaction between the information technology and organizational structure.

### 2.1. Information Technology

Information technology includes all the hardware and software that an organization needs to use in order to accomplish its organizational objectives (Laudon and Laudon, 2012: 88). Information technology can also be defined as the products, methods, inventions, and standards that are used for the purpose of producing information (Kroenke, 2012: 18). An organization's information technology resources are divided into two: information technology (IT) infrastructure and human information technology (IT) resources. IT infrastructure includes hardware, software, communication technologies, shared technical platforms, and databases (Bharadwaj, 2000: 172-173; Weill, 1993: 550). Organizations spend approximately 40% of their total capital expenditure on infrastructural technologies (Masli and others, 2008: 3). Human IT resources include expenditures relating to salary and training of IT personnel as well as IT training for end users (Bharadwaj, 2000: 169-196). Human IT resources bring in a unique innovativeness to firms. They can utilize from the opportunities provided by the infrastructural IT resources towards decision making and creating value. Furthermore, proactive utilization of human resources can provide firms competitive advantage by linking the firm's internal processes and structure with continuously changing external environment (Lin, 2007: 96).

### 2.2. Views on Organisational Structure

Organisations differ from each other in many aspects. According to Crowston and Malone, different organisations can be affected differently by the information technologies. They also point their views on four different areas such as rationalist, information processing, motivational and politics. Rationalist view defends that organisations work by the set out objectives like profit maximization. These organisations more care about fundamental issues like, recruitment, loss of business, management intensity (intensity) levels of hierarchy, centralization, decentralization, differentiation and formalization. Information processing view covers the rationalist view as well as communication models, weak links and social context. Motivational view supports the idea of employees having different objectives than the organisation. However, in this view employees can organise the ways of doing their duties in a parallel way with the objectives of the organisations to make sure of the unity of purpose. On the other side, politic view suggests that organisations may have different group of people who have conflicts and different objectives. This perspectives support that power can be used to combine the objectives together and information technologies may be used by the groups in organisations to empower themselves. The areas this view takes in charge are power, vertical and horizontal organisation (Crowston and Malone, 1994: 250-252).

On the other hand, organizational theorists Burns & Stalker (1994), identify two different organizational structures (organic and mechanistic structures) that are differently influenced by information technologies. These structures are based on different organizational features including the hierarchy, formalization, and efficiency that are key to organizational adaptability. Firms having organic structures, such as firms providing tax and law services, have flat structure and they have relatively less formalized processes.

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The communication between people is more lateral, which is in a network structure, and usually verbal, which does not require significant support from information technologies. And also they are effectiveness oriented; that is they serve to the external market. Internal processes are not so complex; that is why efficiency is not important as mechanistic firms. In contrast, mechanistic structure firms, such as GE and Toyota that are large manufacturing firms, have highly hierarchical structure in which written and digitized communication is a necessity. This requires significant support from information technologies. The rules and norms are predetermined, and processes are formalized and standardized. Their internal processes are significantly complex, thus efficiency is a big concern. That is why, it is more likely that information technologies will make a greater impact on mechanistic structure firms, since the processes and structure is more suitable for the deployment and utilization of information technology resources.

### 2.3. Interaction Between Information Technology and Organisational Structure

According to Marcus and Robey, there is technological, organisational and interactive necessity between information technologies and organisational structure (Crowston and Malone, 1994: 253-255). Technological necessity argues that technology itself have some certain impact on the organisational structure. A study done by Woodward on this shows that business formal structure take its shape by the production technology they use in the organisation. At this stage organisational change can be triggered by the technology. Secondly, organisational necessity looks at the change from an adverse perspective. This view argues that managers can implement the change including technology in an organisation in order to fulfil the needs of the organisation. The last necessity on this view shows that interaction between what technologies allow and what managers and organisation try to achieve is complexity (Woodward, 1980). Crowston and Malone agree to this view and support that the needs of the organisation and the current technology can bring the organisational change (Crowston and Malone, 1994: 253-255).

Laudon & Laudon (2012) argues that all organizations have a structure or shape, while the type of information technologies utilized in an organization generally reflects the structure of the organization. For example, a hospital, which is the basic example of the professional bureaucracy structure, is dominated by department heads with weak centralized authority. It is therefore possible for a hospital to deploy and utilize a parallel patient record system operated by the administration, doctors, and other health-care professionals including nurses and social workers. Another example would be the small-sized entrepreneurial structure firms that usually have simple organizational structures and are managed by entrepreneurs serving as the owner and chief executive officer. Such small firms typically have weakly designed systems and the value and usefulness of these systems to the organization quickly decreases. On the other hand, it is less likely to find a single integrated information technology infrastructure in large firms having divisionalized bureaucracy structure. These firms have many locations, so each location has its own set of information systems and technology infrastructure (Laudon & Laudon, 2012: 88).

## III. IMPACT ON ORGANISATIONAL STRUCTURE

Main discussions come under the structure of the organisations talks about the technology being determinative factor to form businesses as centralistic. On the other side, deep research on these areas show that technology has an impact on authority and control mechanism, number of organisational level, and the number of department within the organisation (Bensghir, 1996: 243).

### 3.1. Centralisation and Decentralisation

Today's knowledge society cannot allow organising workload in Weberian or Taylorist way. This is because of the nature of information or service oriented workload which does not work in the same way as standard of production of goods. Technology provides flexibility to the organisations and this allows them choose in between centralised or decentralised activity. On the other side of the technology, organisational culture and environmental factors affect forming hierarchy in the organisation. If the technology used in the organisation promotes flexibility, creativity and participation, then the structure of that company becomes more decentralised. According to Lan Barbour, computers in the past created head offices to control the organisation from one point, however especially

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after the 1980s booming technology allowed Laptops and Tablets in the business life and this can lessen the workload of head offices as the management can be done by small and many work station (Barbour, 1997: 169).

### 3.2. Authority and Control

Henri Fayol defined authority is to right to give orders and expect obedience. Classical management view support the centralisation of the authority to ensure coordination between small jobs (Etzioni, 2005: 43-67). Horizontal or vertical authority in the company shows how the control mechanism work either centralised or decentralised. With the emergence of computer in the business life, control and the power of authority was expected to be centralised. Nevertheless, recent developments in the information technologies allow both centralised and decentralised authority and control mechanisms (Bensghir, 1996: 249).

### 3.3. Space of Control

By the new economies forming everyday in the world business environment, space of control has been observed to be narrowed. Space of control as a term refers to the number of human resources who report to the line manager or senior management team. By the new technologies businesses start using every day, it is believed that less workforce needed in organisations. However, Whisler draws a different perspective than this natural outcome of the technology. According to him, it is important to have a look at the degree of centralisation of control by the computerisation. His argument support that information technologies bring out centralisation of control and it cause the narrowance of the space of control in the short term operational level and in the long term in managerial level (Whisler and others, 1967: 46).

### 3.4. Change in Organisational Level

By the great use of production and information technologies even enterprise systems, many changes in the structure of organisation became important. One of them could be the less need of human workforce because of the machines which can help doing things at a low cost and less time efficiently. Today's enterprises based on knowledge and value information as it is the only and unique source to the company. Wriston believes that need for more organisational level has been decreased due to less processing information from one level to the other level in knowledge based organisations. New economic system creates its own hierarchic businesses which dependence is the participation, horizontal movements in a highly competitive business environment. In organisations now, knowledge, freedom, creativity are more supported instead of traditional hierarchic structure (Wriston, 1994: 19).

### 3.5. Department Structure

Creating information and processing this information moves horizontally in the organisation level nowadays. The effect of change in economical variables and globalisation makes today's enterprises more empowered by the information technologies; therefore they do not look for moving production processes from one unit to another unit. Management stages are disappeared due to reengineering processes and new management styles. Even leadership can start at a traditional way and end up in different person because of the nature of the job given. As a result, information technologies promote reunion of the departments or dividing these departments via its functions or creating new departments (Bensghir, 1996: 251).

### 3.6. Process of Decision Making

Decision making is the focus of the organisational action as a managerial and organisational process. In an highly competitive business world, it is vital that the data collection, evaluation, identification of alternative strategies and final decision must be done effectively and timely. Decision-making is a way of processing information. Managers process the information, decide and then make sure that the decision is fully understood and applied by the workers. Decision Support Systems, Expert Systems, Executive Support Systems and many more affected directly decision-making process in a positive way. Laudon et al discusses that number of decision taken is risen, time of planning is lessen, decision making can come out of being personal, change in the nature of administrative work becomes positive (Laudon and Laudon, 1994: 566).

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### 3.7. Communication Process

Communication process shapes all managerial sub-systems of the organization (planning, organizing, implementing, coordinating, monitoring). As in all areas of information technology in organizations has changed the concept of communication and continues to change rapidly. According to Alsene, workers in this information age can work without being isolated from each other, they have greater connection than before, and they also can be free and mobile which bring out many benefits to the organisations. New communication technologies allow dialogs and exchange in knowledge concurrently. Email, telephone dismissed the usage of paper and slow communication in businesses (Alsene, 1994: 657). Huseman and Miles also suggest that the technology especially in information have a great impact on the communication of businesses either internally or externally (Huseman and Miles, 1988: 181-203).

### 3.8. Organising the Work

Traditional management approaches, particularly Weber's bureaucracy approach works to standardize as much as possible and to ensure coordination between standardized work is based on the centralization of authority. Henry Ford brings the term of mass production to business life by following the roots of Taylorism. Mass production brings the routine into workers life because of doing the same job all the time fast and efficiently. Karl Marx on the other side describes the organisation of the work as "Masses of labourers crowded into the factory, are organized like soldiers. They are placed under the command of a perfect hierarchy of officers and sergeants" (Marx and Engels, 1969: 98-137). However, today, all business functions like production, marketing, accounting, finance, management, R & D, procurement, human resources, etc are performed by using information technology. This new style brings the flexibility as people can work from home or they can work independently, personal or as a group. According to Hammer and Champy, work processes needed this change to be simplified and organised better (Hammer and Champy, 1996: 46-57).

## IV. CONCLUSION

This study has discussed the significance of information technologies from the perspective of organizational structures. It should be recognized that all organizations throughout the world have been structured and shaped in a certain way. With the emergence and widespread utilization of information and communication technologies in organizations leads to a need in changing and improving the organizational structures. It is possible to articulate that the structures of today's contemporary organizations are determined and shaped based on the information technologies and systems they deploy and use. Therefore, understanding the role of information technologies in the structures of the organizations has utmost importance.

Modern business environment has thought the world brand-new techniques to cope with the challenging and competitive market place. Changes happened in many different areas of business, however, most importantly, technology has driven all the aspects of management and organisational structure. Technology had its major transformation in the last couple of decades and this transformation is not only in technology, but in economic, social, cultural, political and geopolitical areas. Globalisation through rapid changing technology, businesses started to cope up with the changes and eventually the structure of the firms became more active and flexible.

First development we could feel in the business world must be the communication. Today, it is the easiest thing to communicate from one side of the world to the other side. Even the techniques of communication has been developed rapidly and now in a very advanced level. Additionally, organising the work in businesses has many different ways, departments and their functions may have changed and maybe lessen over the time. Technology definitely affected the need for human being in organisations. There are less need to the workers because of this rapid changing information technologies. This study also shows that structure of the organisations changed from centralised to the decentralised. Even authority and control left its place to the more flexible base which allow leader to move

from one to another depending on the job and responsibilities. Due to these increasing changing in information technologies as well as e-businesses and e-trades have changed the organisational structure.

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# The Differences between Online Banking Users and Non-users

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**Abstract: Purpose;** This study examines factors influencing intentions towards internet banking (IB) among bank clients in Saudi Arabia. Specifically, it examines the differences between IB users and non-users in their characteristics and in the factors that influence their intention to start or continue using IB. **Design, Methodology, Approach;** Questionnaires based on the Decomposed theory of Planned Behaviour (Taylor and Todd, 1995) were administered online to existing IB users (N= 651) and in person to non-users (n=408), all clients of Riyad bank in (Riyath), Saudi Arabia. **Findings;** Perceived Relative Advantage and Compatibility, Ease of Use, Self-efficacy, Resource Facilitating Conditions and Perceived Website Characteristics are significant in predicting users' intention to continue using IB, but not in non-users' intention to start; for non-users, only Perceived Trust and Subjective Norms are significant. **Practical Implications;** Banks' strategies to encourage adoption of IB should include two dimensions, Non-users should be targeted by emphasising safety, security and social acceptance; users by enhancing the features important to them, with website design of key importance. **Originality and value;** the research refines and extends the original DTPB model with the addition of a new construct, Website Features. It confirms and clarifies the distinction between technology users and non-users suggested in previous research. It also provides insights from a novel context, Saudi Arabia, contributing to cross cultural understanding of technology adoption.

## 1. Introduction

Internet banking (IB) will be critical to the success of many banks in the twenty-first century (Walker and Johnson 2005; Waite 2006) as they search for ways to gain, sustain or combat competitive advantage. In order for banks to be able to benefit from this technological development, however, they need to understand the perceptions, attitudes and needs of existing and potential customers. This knowledge is crucial to the development of suitable marketing strategies (Peter and Olsson 2008). Banks need to know who, specifically, is adopting this new technology and why (Lichtenstein and Williamson 2006). A number of authors, therefore, have called for research that facilitates understanding of these issues (Ndubisi and Sinti 2006; Kuisma et al. 2007).

In Saudi Arabia, where this study was conducted, all eleven Saudi commercial banks were offering a full interactive Internet service by 2005, and Saudi banks are reported to spend some \$190 million annually (Asharq-Alawsat 2003) on developing their Internet capabilities. Nevertheless, concerns have been expressed about the low level of e-commerce transactions generally (Abdulgader 2004; Al-Grefani 2004) and Saudi banks are reported to find the level of adoption of IB disappointing (Luthra 2007). Questions have been raised about levels of knowledge and skills for accessing Internet services (Almobarraz 2007); availability of hard/software and technical support (Aladwani 2003); security issues (Almogbil 2005); cultural barriers (Al-Gahtani et al. 2007) and the quality of services offered (Sohail and Shaikh 2008).

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Given a scenario in which little research has been conducted concerning the adoption of IB services outside of developed countries, this study uses a technology adoption model based on the Decomposed Theory of Planned Behaviour (Taylor and Todd 1995) to investigate the factors influencing Saudi customers' adoption of IB. In particular, it examines differences between current IB users (online clients) and IB non-users (offline clients) in their characteristics and in the factors that influence their intention to start or continue using IB.

In the following sections, an overview of the IB market in Saudi Arabia is provided to present status and potential of these services. The theory underpinning the research model is explained and an account is given of the data collection and analysis procedures. The findings show clear differences between IB users and non-users in the factors influencing their intentions towards IB. Practical and theoretical implications are discussed.

## 2. The Internet Banking Market in Saudi Arabia

Saudi citizens were officially isolated from the Internet until 1999 (Al-Hajry 2004) and public access is government-filtered. Nevertheless, Internet use has grown rapidly; according to the Communications and Internet Technology Commission (CITC), the number of Internet users has increased from just 200,000 in 2000, to 6.4 million (about 26% of the population) in 2008 ([www.citc.gov.sa](http://www.citc.gov.sa)). The large population (around 22 million), high proportion of young people (almost half is under the age of 20) and high disposable income make Saudi Arabia one of the fastest growing Internet markets (Ministry of Economy and Planning, [www.planning.gov.sa/statistics/2010](http://www.planning.gov.sa/statistics/2010); Internet World Statistics, [www.Internetworldstats.com](http://www.Internetworldstats.com)).

There is only one type of bank that engages in Internet banking in Saudi Arabia, that is, bricks and mortar banks which offer services via their websites in addition to their traditional delivery channels. There are considerable differences among banks in the range of services and level of interactivity available. Banks have witnessed rapid growth in stock market activity among their clients ([www.sama.gov.sa](http://www.sama.gov.sa)). Nevertheless, during the country's biggest Initial Public Offering in 2008, IB transactions accounted for only 15% of the 8.85 million participating clients (Alwatan 2008).

## 3. Conceptual Framework

Lack of understanding of customer behaviour has been identified as the key to the failure to adopt Internet banking (Saleh 2003). Consumer behaviour is a dynamic web of interactions and exchanges that take place when consumers search for, acquire, evaluate and dispose of products and services that they expect will satisfy their needs (Schiffman et al. 2008). Such behaviour is theorised to be a function of two main sets of factors: environmental (external) factors such as culture, social class and reference groups, and individual (internal) factors such as age, education, income, lifestyle and attitude (Assael 2004; Solomon et al. 2006; Peter and Olsson 2008).

In relation to IB specifically, a large number of studies have turned to technology adoption models in an attempt to understand what influences or deters consumer adoption of this service. As a result of lack of established theory in the information technology (IT) domain, including IB, researchers have drawn on models developed in other areas, for example, intention models drawn from social psychology (Harrison et al. 1997).

According to the Theory of Reasoned Action (Fishbein and Ajzen 1975), behaviour is governed by intentions. Numerous studies have supported this relationship, including some in the Internet banking context (Yousafzai 2005; Shih and Fang 2006). Intentions, in turn, are said to be a function of attitudes and subjective norms (the influence of others). The Theory of Planned Behaviour (Ajzen 1991) adds the idea of behavioural control, that is, an individual's perception of the ease or difficulty of performing a particular behaviour, including beliefs about personal ability or self-efficacy, and beliefs about external facilitators and barriers, such as time and money. The Innovation Diffusion Theory (Rogers 1995) highlights the importance of the way the characteristics of the innovation are perceived, for example its compatibility with the user's lifestyle (Hernandez and Mozzon 2007) relative advantage, reflecting users' evaluation of the benefits when a new technology is used (Rogers 1995), ease of use and image. The Decomposed Theory of Planned Behaviour (DTPB) (Taylor and Todd 1995) combines aspects of the aforementioned theories. It hypothesises that attitude, subjective norms and perceived behavioural control will influence the decision to use the technology. However, it extends both the TRA and TPB by decomposing these elements into multi-dimensional constructs, providing higher explanatory power and a more precise understanding of the antecedents of behaviour (Tan and Teo 2000; Sohail and Shamughan 2005; Shih and Fang 2004; MdNor 2005).

In the light of the foregoing discussion, the research model was based predominantly on the DTPB (Taylor and Todd 1995). However, the multi-dimensional constructs for attitude were primarily drawn from the instrument developed by Moore and Benbasat (1991). In

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addition, given the uncertain environment of the Internet, trust was included, as an additional factor, among the elements which may affect the customer's attitude toward adopting Internet banking (see for example: Saleh 2003; Kim and Prabhakar 2004; Yousafzai 2005; Shu-Fong et al. 2007).

"Website features" was developed by the researcher since in Internet banking specifically, features incorporated in the design of website interfaces have been found to affect consumer online behavioural intentions to use Internet banking (Waite and Harrison 2002; Ndubisi and Sinti 2006). Actual behaviour of online banking was not measured in this study. However, given the evidence, reported earlier, of the link between intention and behaviour, it is assumed that factors influencing intention toward IB will also, indirectly, influence usage. The research model is shown in figure 1.

#### 4. Methodology

Data were collected using two questionnaires: a website survey for online clients (IB users), and a conventional paper questionnaire for offline clients (IB non-users). These were designed to identify specific factors affecting the intention to adopt IB, and what distinguishes IB users from non-users. A five-point Likert-type scale was used to explore respondents' perceptions in relation to the constructs of the research model.

For Internet banking users, an invitation to participate was distributed by Riyad bank to online clients, including a link to the online questionnaire. Of 677 participants who responded, 651 useable responses were achieved. For off-line clients, the questionnaire was distributed to clients in 15 branches throughout Riyadh, including five women's branches, altogether representing 36% of the bank branches in Riyadh. Of 700 questionnaires distributed, 472 questionnaires were returned, and 409 (58.4%) were usable. The demographic characteristics of respondents were as follows: Women represented less than 25% of all clients, and less than 5% of all online banking clients. 23% of IB non-users were under the age of 25, compared to only 4.8% of users. However, from age 35 onwards, the percentages of IB users in each age group exceeded those of non-users. The income of IB users was noticeably higher than non-users' income. A similar situation was found for qualifications; 72% of IB users held a bachelor degree or above, against 40% amongst non-users. In general IB users were better educated than non-users. The majority of IB users (60%) were private sector employees, followed by government sector employees (26%), whereas the majority of non-users (41%) were government sector employees, followed by 32% in the private sector. This may reflect differences in computer proficiency and access to technology in these sectors. Another relevant factor is that working hours in the private sector are the same as banks' opening hours, so these employees may use electronic banking channels due to difficulty of visiting branches. There was a strong weighting of Internet experience towards IB users, 87.5% of whom had had more than five years Internet experience. The great majority (84.9%) of non-users were not computer or Internet illiterate; indeed 40.8% had used them for more than three years.

#### 5. Analysis

Factor analysis (principal components with Oblimin rotation) was conducted to detect the factor structure in the observed variables. Based on the analysis Perceived Relative Advantage and Perceived Compatibility were combined in one factor, and similarly Subjective Norms-family influence was combined with Subjective Norms-friends' influence, to give a single Subjective Norms variable. Reliability (Cronbach's Alpha) for the revised 25-item scale measuring factors in users' intention to adopt IB ranged from .76 for Trialability to .96 for Intention, while those for the 23 item scale measuring factors in non-users' intention to adopt IB ranged from .71 for Self-efficacy to .97 for Intention.

Following satisfactory outcomes of tests for normality, linearity, homoscedasticity, multicollinearity and reliability, multiple regression analysis was used in order to test the contribution of the predictor variables to variance in the dependent variable, Intention. Results showed the independent variables explained 35% of the variance in users' intention to continue using IB, and 31% of the variance in non-users' intention to start using IB, and 66% as the total explanation of the model (Figure 2 ). Betas were used to identify the importance of each variable in explaining the dependent variable (see Table 2). For IB users, intention to continue using IB was found to be associated with five variables: Perceptions of website characteristics explaining 8.9% of the variance in intention; Resource facilitating conditions explaining 2.4% of the variance in intention; Perceived relative advantage & compatibility explaining .7% of the variance in intention; Perceived Ease of use explaining 0.5% of the variance in intention; and Self-efficacy explaining 0.5% of the variance in intention. Perceived Trialability, Image, Trust or Subjective Norm did not significantly predict intention in IB users. Regarding clients who are not currently users of Internet banking, the findings are shown in Table 3. The only significant variables were subjective norms, explaining 19% of the variance in intention, and perceived trust, explaining 0.7% of the variance in intention.

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To summarize, Perceived relative advantage and compatibility, Ease of use, Trialability, Image, Self-efficacy and Resource facilitating conditions were not significant in predicting intention to start using IB among non-users. This suggests that such factors are less important to non-users than the psychological dimensions of social influence and perceived trustworthiness of IB and may only come into play once bank clients have reached a certain level of interest in IB stimulated by the former factors, (see Table 4).

## 6. Discussion

This research highlighted the differences between IB users and non-users in relation to their perceptions, experiences and characteristics, to obtain a thorough understanding of the phenomenon of IB adoption.

### 6.1. Perceived Relative Advantage

For IB users, perceived relative advantage and compatibility had a significant positive effect on intention to continue using Internet banking. In contrast, relative advantage and compatibility were not found to have a significant effect on non-users' intention to start using Internet banking.

The findings are consistent with previous research which similarly found perceived usefulness to be non-significant for non-users of IB, but significant for users. This may be because the extrinsic benefits of using Internet banking are less clearly perceived and acknowledged by non-users than users (Chung and Paynter 2002; Lichtenstein and Williamson 2006). In contrast, other research found a significant influence of this factor for current users. Chan and Lu (2004), Pikkarainen et al. (2004) Cheng et al. (2006) Hernandez and Mazzon (2007) and Eriksson et al. (2008) all reached the same conclusion, that perceived usefulness is the most influential factor in explaining acceptance of Internet banking. Among specific advantages perceived and appreciated were speed and convenience (He and Mykytyn 2007). Although non-users were able to perceive some relative advantages such as such as comfort, performing the process at any time, avoiding crowds and not having to go out at inconvenient times, perception of IB advantages and compatibility were stronger among users, and more influential on their intention to adopt IB.

This result suggests that since the perceived influential benefits cannot take place until IB is used, non-users will not be able to perceive relative benefits that can influence their intention until they start using IB. It would seem, therefore, that other factors must first operate to overcome bank clients' inertia or the effect of deterrent factors, to stimulate first use of the service.

### 7.2. Perceived Ease of Use

Perceived ease of use was found to positively affect the intention to continue using IB for users, but have no significant impact on non-users' intention to start using it.

One interpretation is that non-users do not have a clear picture what IB is about and how much difficulty is associated with it, so that it does not affect their intention to use IB. On the other hand, clients who have become IB users can perceive the ease of IB use every time they log in. Another interpretation (Laukkanen et al. 2008) is that psychological barriers play a role in resistance to adoption of IB among non-users, regardless of perceived ease. On the other hand, there are studies that have found perceived ease of use (or lack of it) to be influential. Mavri and Ioannou (2006) found perceived difficulties played a crucial role in Greek consumers' adoption or rejection of IB, while He and Mykytyn (2007) found that customers will be more likely to adopt online transactions such as payment methods if the procedure is simplified.

Findings also suggested the need for back up from other approaches to show the ease of using IB, as clients, especially new users, did not find it helpful to have this provided through the website itself. A certain level of skill in using the computer and IB is needed to access and apply the information on the website, so those who are experiencing difficulty, or perceive themselves as lacking the relevant skills, may not benefit from such material. Another point worth noting is that perceived ease of use appears to be less significant for IB users than perceived usefulness. Similarly, Gefen and Straub (2000) suggest that in many cases the new technology is adopted because of its extrinsic aspect (relative advantage) and not its intrinsic aspect such as ease of use. This could be because, as clients gain more experience in relation to computers and the Internet, and ease of use becomes less of a problem for them, more cognitive considerations emerge and gain significance in determining behavioural intentions towards IB.

### 7.3. Perceived Trialability

Trialability was hypothesized to affect intention based on the assumption that the opportunity to try a specific technology will lower clients' doubt and fears that may influence their opinion about the technology (Rogers1995). However, this hypothesis was not supported. Trialability of Internet banking was not found to have a significant effect on the intention to adopt IB amongst users or non-users. Hernandez and Mazzon (2007) similarly found that among Brazilian clients, whether they were users or non-users, greater trialability of IB did not affect the intention to use/continue to use IB. However, the findings contradict a recent finding by Gounaris and Koritos (2008a), that trialability was an important contributor in the prediction of IB usage for both users and non-users. It may be that such differences reflect differences in the context, nature and extent of the trial experience available.

### 6.4. Perceived Image

Perceived positive image did not influence the intention to adopt IB among users or non-users. From a practical perspective, although this factor does not have a significant influence on adoption of IB, banks might want to depict the positive image gained by users who engage in this technology. For example, Gounaris and Koritos (2008a) found that there is an increase in consumers' perceptions of gains in social image due to IB adoption and the ability to demonstrate among their peers the benefits of IB usage.

### 6.5. Perceived Trust

As hypothesized, trust was found to have a significant effect on the intention to use Internet banking in relation to non-users. Theoretically, trust has been acknowledged as one of the critical factors in uncertain and risky environments such as online transactions. (e.g. Saleh 2003; Kim and Prabhakar 2004; Kassim and Abdulla 2006; Botelho 2007; Grabner-Kräuter and Faullant 2008; Poon 2008). Trust can be used as a strategy to reduce this uncertainty by implementing safeguards to protect clients from potential unfavourable consequences. This result does not mean that users have no security and privacy fears, but perceptions of other advantages governed their choices, rather than fears. These results support similar findings in the literature. For example, Lee et al. (2005) found persistent non-users are more likely to perceive risks than current adopters, because they rate security and size of bank to be more important than do current adopters. Lallmahamood (2007) identified security and privacy as major concerns that inhibit clients from using Internet banking. Clients in Saudi Arabia are still concerned about issues such as lack of protection by government policy and legal regulation, including financial and privacy protection, besides concerns about system security itself.

### 6.6. Subjective Norm

Subjective norms were found to have a significant effect on the intention to start using IB. In other words, social pressure and the opinion of people close to the individual contribute to shape clients' behaviour towards the intention to start using Internet banking. The finding that subjective norms are significant in influencing non-users' intentions is consistent with theory. As Ajzen (1991) postulates, attitudes and beliefs of others in groups to which an individual belongs can shape individuals' behaviour toward the use of a specific technology. Similar significant effects of subjective norms on intention have been reported in related literature. Srivastava (2007) suggested that if a client sees most of his or her colleagues or friends using Internet banking then it may influence his or her decision to adopt this option. Similar results are reported by Gopi and Ramayah (2007) and Sha et al. (2008).

### 6.7. Self-Efficacy

The results of this study support the view that self-efficacy has a positive significant effect on intention of users to continue using IB, but not of non-users to start using it. This finding implies that lack of confidence in using IB may create discomfort which deters future use of this channel. The results are consistent with findings in other empirical studies (e.g. Hsu et al. 2006; Gounaris and Koritos 2008; Kim et al. 2009). Abu Shanab (2005) and Xue et al. (2007) found customers' use of self-service channels in retail banking was affected significantly by clients' perceptions of their own self-efficacy. Kim et al. (2009) found self-efficacy was an important factor in explaining motivation of individual judgments and behaviours. It affects positively an individual online consumer's purchase intention. This finding suggests that clients who use not only computers and the Internet, but also IB itself, may still perceive themselves as lacking sufficient skill to use IB effectively. Whilst perceptions of self-efficacy can be formed partly on the basis of vicarious experience or persuasion, actual experience is an important part of the formation of such judgements, and is also likely to influence expectancies as to the likelihood of positive outcomes, which Lichtenstein and Williamson (2006) found to affect Internet self-efficacy positively. It is important, therefore, that the client who uses IB should have a positive experience and a successful outcome. This would increase his or her sense of self-efficacy with the IB system and, hence, the likelihood of using it again. The clarity of the website and easy access to help

when necessary would be important in generating such positive experiences and feelings.

### 6.8. Resource Facilitating Conditions

The results reveal that resource facilitating conditions have a positive significant effect on intention to continue using IB for users, but not on intention to start using IB for non-users. One reason for the impact of facilitating conditions on intention to adopt IB amongst users may be that they were able to evaluate precisely prices of Internet connection, which is still very high in Saudi Arabia compared with other countries. Widely available resources to access Internet banking would mean an individual's concern about the accessibility of the resources to use the technology would diminish. In contrast to the current findings, in a recent study Hernandez and Mazzon (2007) found that having a home PC does not play an important role in determining the intention to use/continue to use IB. This may be because, as PC ownership increases, other factors become more significant in the acceptance or rejection of IB. Indeed, Srivastava (2007) found that in the case of the clients who did not use Internet banking services, having all facilities at their disposal, technology was not the biggest issue. Thus, in the case of non-users of IB, the absence of significance of resource facilitating conditions may have two explanations; either they did not have the opportunity to experience and evaluate such conditions, or, irrespective of the availability of resource facilitating conditions, there were other factors that weighed more heavily in their decision not to use IB.

### 6.9. Perceived Website Characteristics

This hypothesis was examined for IB users only. The results show that perceived effectiveness of website characteristics positively affects the intention to continue using IB services. Indeed, this was the most influential of all the factors investigated. Perceived characteristics of the Internet banking website as a new innovation have the ability to predict and explain the decision to adopt this technology. Similarly, Jaruwachirathanakul and Fink (2005) discovered that the main attitudinal factor that appeared to encourage the adoption of Internet banking in Thailand was "Features of the website." Indeed, a large number of studies have similarly shown customer reactions to online services to be influenced by website features such as simplicity (Casaló et al. 2007), speed (Nah 2004; Dabholkar and Sheng 2008; Migdadi 2008), and user-friendly interface, usability and familiarity (Liang and Lai 2002). As Grabner-Kräuter and Faullant (2008) pointed out, website characteristics that evoke the feeling of trust and make the Internet banking interface more attractive and easier to navigate are important to increase the adoption rate of Internet banking. These findings validate the decision to incorporate website features as a new component in the model of technology acceptance developed for this study.

## 7. Conclusion, implications and future research

The paper began with a proposed model of technology adoption drawing on existing models and theories, particularly the DTPB, and with the significant addition of website features, as a new contribution of this research. Based on the research findings, it is now possible to refine that model. Whilst the findings support the significant influence of all the variables included in the original model (except perceived trialability and image), they show the model to be too simplistic in that it proposes a single set of factors for all clients. The research findings, however, show that in the case of IB, the factors influencing the intention of non-users to start using the service are quite different from those influencing the intention of existing users to continue. These differences are depicted in Figure 2.

As shown and as discussed previously, only two factors, trust and subjective norms, influence the intention of non-users to start using IB. In part, this is because certain aspects of IB can best be recognized and evaluated based on experience. Non-users cannot fully imagine how IB will fit into their lifestyle or what benefits it could bring, they may not know how much it costs, how easy it is to use and whether they will be able to use it successfully. Above all, they have no experience of website characteristics. Nevertheless, some at least of these features may be advertised and discussed in society, so that it may be possible even for non-users to form some sort of judgement about them. Such judgements, however, do not seem to be influential, without further support, and in the absence of direct experience, subjective norms play an influential role. These may be based on the experience, or even simply on the norms, values and perceptions of those close to the individual, such as family and friends. By following subjective norms, the client places reliance on the judgement of those he/she trusts and avoids the risk that may be attached to being the innovator in his/her social group.

The other significant factor influencing IB non-users is trust, which again can be seen in relation to risk. By conducting his/her banking business online, the client faces a number of risks: that he or she will make a mistake, that personal data will be misused or will be accessible to others, and so on. To outweigh those risks, the prospective user needs to have a high level of trust in the competence and goodwill of the organisations concerned, to put in place and maintain effective security systems, and to treat online clients and their data with integrity. Trust is important in any business relationship, but in the absence of the cues provided by face-to-face contact, and the personal relationship so built up, it becomes of more concern.

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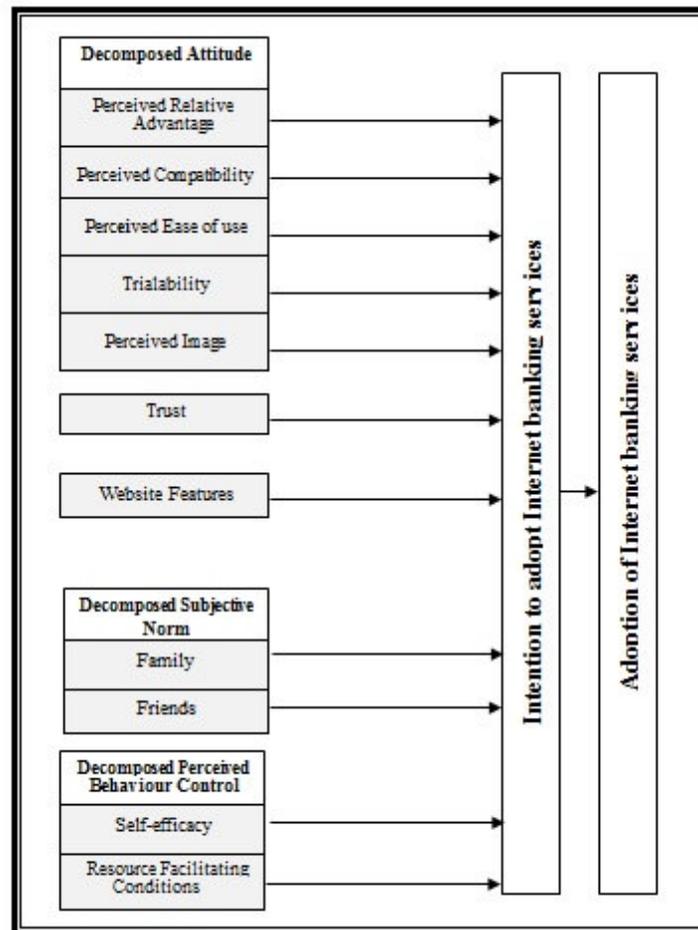
Once these hurdles have been overcome, and given a supportive social environment, the intention may be formed to start using IB, and the non-user becomes a user. At this point, trust and subjective norms cease to be influential. When these factors are sufficiently favourable to allow the initial step in using IB, they pose no problem to the continuation of that behaviour. For IB users, however, another set of factors become significant when conjecture and vicarious experience are replaced by direct experience of the technology and the service, which grows over time. Through use of IB, the client forms an evaluation of the benefits it brings (such as speed and convenience); how easy the system is to use (such as clarity of on-screen instructions); his or her perceived competence to use the system effectively and obtain the desired result; the availability and cost of the necessary resources (e.g. Internet connection); and the characteristics of the website itself. If all these are favourable, the user is likely to form the intention to continue using IB and can be described as an adopter. If one or more of these factors is unfavourable, however, the client may become discouraged and dissatisfied and may discontinue use, reverting to the old and familiar channels that worked for him/her in the past.

This implies that banks' strategies to encourage adoption of IB should include two distinct dimensions. On the one hand, non-users should be targeted by emphasising the safety and security of IB, and its acceptance in society. On the other hand, strategies for retaining IB users need to be based on enhancing the features that are influential to them, with website design potentially playing a key role.

The findings provide a basis for future research. Further investigation of the proposed model in different countries, in order to understand cross-culture effects on IB adoption is necessary to verify the extent to which the reported findings can be generalised.

8. Appendices

Figure 1- The Research Model



(Source: the author)

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Table 1- Demographic description of IB users and non-users

Demographic Variable		IB Non-Users N = 409		IB Users N = 651	
		Number	%	Number	%
Gender	Male	294	71.9	603	92.6
	Female	115	28.1	48	7.4
Age	18 to less than 25 years	95	23.2	31	4.8
	25 to less than 35 years	156	38.1	213	32.7
	35 to less than 45 years	114	27.9	219	33.6
	45 to less than 55 years	38	9.3	164	25.2
	Above 55 years	6	1.5	24	3.7
Monthly income (SR)	Less than 4000	104	25.4	34	5.2
	4000 to less than 8000	154	37.7	96	14.7
	8000 to less than 12000	89	21.8	152	23.3
	12000 to less than 16000	30	7.3	116	17.8
	16000 to less than 20000	13	3.2	85	13.1
	20000 or more	19	4.6	168	25.8
Qualification	Less than High School	70	17.1	32	4.9
	High School	175	42.8	149	22.9
	Bachelor degree	152	37.2	371	57
	Master degree or above	12	2.9	99	15.2
Occupation	Student	52	12.7	19	2.9
	Private sector employee	132	32.3	392	60.2
	Government sector employee	168	41.1	174	26.7
	Self-employed	28	6.8	41	6.3
	Retired	9	2.2	19	2.9
	Jobless	4	1.0	3	0.5
	Housewife/Husband	16	3.9	3	0.5
Internet Experience	No experience	66	16.1	-	-
	Less than 1 year	82	20	9	1.4
	1 year to less than 3 years	94	23	33	5.1
	3 years to less than 5 years	66	16.1	39	6
	5 years to less than 7 years	48	11.7	131	20.1
	7 years or more	53	13	439	67.4

Table 2- Coefficients for IB users

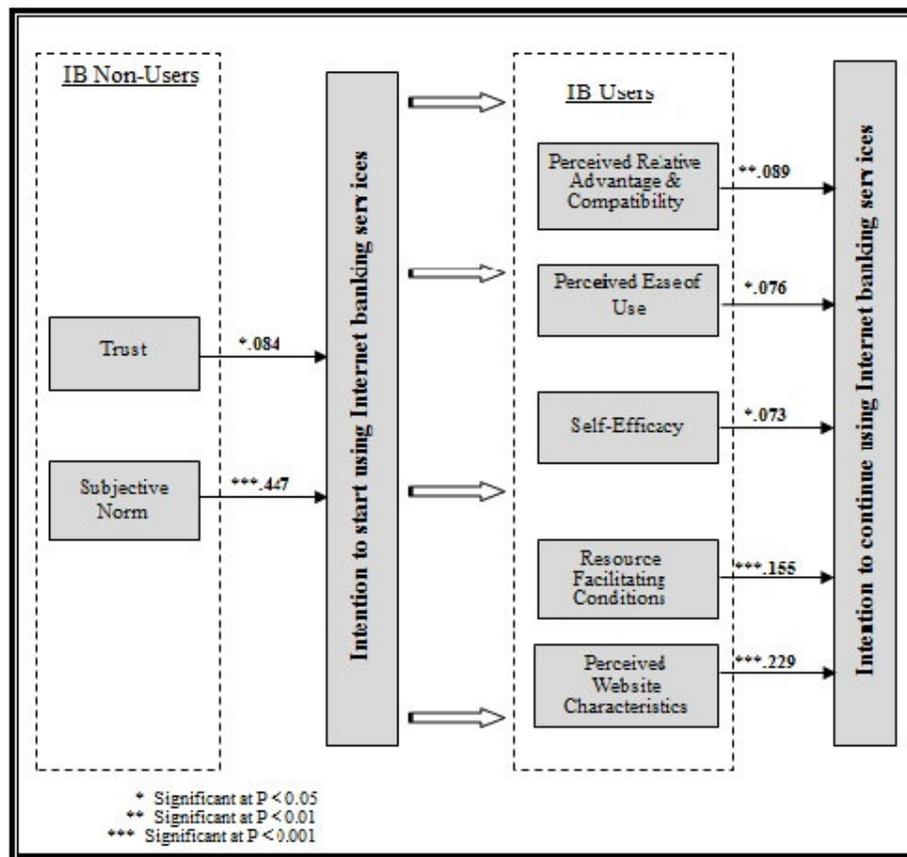
IB users Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	.348	.249		1.397	.163					
Perceived Relative Advantage & Compatibility	.163	.058	.115	2.791	.005	.415	.110	.089	.597	1.674
Perceived Ease of use	.092	.039	.096	2.377	.018	.372	.093	.076	.623	1.605
Perceived Trialability	.013	.023	.020	.572	.568	.127	.023	.018	.853	1.172
Perceived Image	.046	.024	.074	1.916	.056	.269	.075	.061	.690	1.450
Perceived Trust	.048	.039	.052	1.232	.218	.363	.049	.039	.580	1.726
Subjective Norm	.013	.023	.021	.551	.582	.222	.022	.018	.734	1.362
Self-efficacy	.110	.048	.097	2.276	.023	.411	.090	.073	.565	1.769
Resource Facilitating Conditions	.231	.047	.190	4.869	.000	.435	.189	.155	.670	1.493
Perceived Website Contents	.240	.033	.245	7.170	.000	.397	.272	.229	.873	1.146

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Table 3 - Coefficients for IB Non-users

IB non-users Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	.951	.267		3.569	.000					
Perceived Relative Advantage & Compatibility	.030	.069	.027	.437	.662	.240	.022	.018	.460	2.175
Perceived Ease of use	-.024	.059	-.024	-.410	.682	.200	-.021	-.017	.502	1.993
Perceived Trialability	.019	.056	.016	.338	.736	.178	.017	.014	.796	1.256
Perceived Image	-.088	.051	-.090	-1.732	.084	.205	-.086	-.072	.636	1.572
Perceived Trust	.112	.056	.115	2.021	.044	.291	.101	.084	.532	1.879
Subjective Norm	.587	.055	.536	10.738	.000	.542	.473	.447	.695	1.439
Self-efficacy	-.060	.060	-.057	-1.003	.316	.197	-.050	-.042	.538	1.858
Resource Facilitating Conditions	.050	.052	.048	.949	.343	.187	.047	.039	.664	1.507

Figure 2 The Final Research Model



(Source: the author)

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## Acceptance of Mobile Banking in Nigeria: A Modified TAM Approach

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**Abstract:** In order to reduce cash handling cost of banks amongst other objectives, the Central Bank of Nigeria introduced the 'cashless policy'. The success of this policy hinges on the adoption of alternative payment systems one of which is mobile banking. Thus it is imperative for policy makers and other relevant stakeholders to anticipate and deal with inhibitions surrounding the adoption of mobile banking by bank customers in the country. This study investigates the determinants of mobile banking adoption in Nigeria using a modified version of Technology Acceptance Model (TAM). This incorporates Perceived Risk, Facilitating Conditions and Demographic Characteristics (Age, Gender, Educational Qualification and Income) to Perceived Usefulness and Perceived Ease-of-Use as determinants of Mobile Banking Adoption. We also propose that this relationship is mediated by attitude towards mobile banking adoption. A total of 250 bank customers from the Lagos area were selected and a structured questionnaire was designed and copies distributed to them. Data was analysed using multiple regression and computed using SPSS 20.0 computer application. Results show that Perceived Usefulness, Perceived Ease-of-Use, perceived Risk, Facilitating Conditions, Age, Educational Qualifications and Income significantly determine Mobile Banking Adoption. However, the relationship between gender and Mobile Banking Adoption is not significant. The outcome of this study has some implications to m-banking policy formulation and implementation. It also throws more light into what should be done to improve m-banking adoption rate in Nigeria

**Keywords:** Mobile Banking, Technology Acceptance Model, Perceived Risk

### 1.0 Introduction

The introduction of Global Systems for Mobile Communication (GSM) in 2003 has changed the face of mobile communication all over the World. Virtually every aspect on human interaction is being affected by the use of mobile phones (Odumeru, 2013). Nowadays, mobile phones function as handheld personal computers in their own rights (Kiesnoski, 2000). The cheapest cell phone today has enough computing power to become a digital "mattress" and digital bank for the poor (Friedman, 2010). This is further proliferated by the phenomenal growth in mobile phone usage in the World. Fuelled by the fire of globalisation, mobile banking also known as m-banking is gaining prominence all over the world. For instance, the number of mobile transactions in South Korea rose on a daily average to 287,000 in 2005 up 104%, the number of registered users by 108% in comparison to 2004 (Korea Times, 2006). In the US, 30% of household are projected to bank using m-banking in 2010 alone (Mobile Marketing Association, 2009). The number of mobile banking users in China increased by 150% between 2010 and 2011 (Cellular News, 2011). In Europe, many bank customers are willing to pay extra for utilising mobile banking (Tiwari & Buse, 2006). Since the launch of Kenya's M-Pesa mobile money accounts, more than 13 million Kenyans are using their phones to pay for goods, get cash from ATMs, receive payments and hold savings, in a wave that has seen more than half the population now using financial services. Nigeria today has over 100 million active

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mobile subscriptions making the country a fertile ground for the use of m-banking. This perhaps informed the decision of the Central Bank of Nigeria (CBN) to licence 16 mobile money operators to carry out a pilot of a mobile financial services system for a period of four months to demonstrate that the system can work in the country (Daily Times Nigeria, 2011 & UNCTAD, 2012)

In 2012, the Federal Government of Nigeria through the regulatory financial institution: The Central Bank of Nigeria (CBN) introduced what it called the cashless policy to drive the country's development and modernisation of its payment system. This is expected to amongst other objectives; help Nigeria in its vision 2020 goal of making the country one of the 20 biggest economies by the year 2020. Other reasons for this policy is to reduce the cost of banking services (including cost of credit) and drive financial inclusion by providing more efficient transaction options and greater reach and to improve the effectiveness of monetary policy in managing inflation and driving economic growth. Lagos was chosen as the pilot states with plans to implement this policy nationwide. The policy stipulates cash handling charges on daily cash withdrawals or cash deposits that exceed N500,000 for Individuals and N3,000,000 for Corporate bodies. The policy also sets a withdrawal limit of N150,000 for all third party cheques. To ensure success of this policy, all banks are expected to deliver electronic banking channels and encourage customers to use same (CBN, 2011). However, the success of the cashless policy is predicated on the development and introduction of alternative payment systems some of which include e-banking, m-banking, e-wallet, ATM cards etc. Thus a study such as this will identify key factors affecting one of the alternative payment systems being encouraged by the CBN; Mobile Banking. Once these factors are empirically established, policy formulation on encouraging the use of mobile banking would be aided. Also, a model describing the acceptance of mobile banking in Nigeria will help policy makers anticipate inhibitions surrounding its acceptance, thus further strengthening the accuracy of relevant policies.

This paper investigates the key determinants of mobile banking in Nigeria using a modified version of the Davis (1997) Technology Acceptance Model (TAM). There are 5 sections in this paper; Section 1: introduction; Section 2: Problem Statement; Section 3: review of Relevant Literature; Section 4: Methodology; Section 5: Results and Discussion of Findings; Section 7: Conclusion and Recommendations

## 2.0 Statement of the Problem

The success of the cashless policy depends to a large extent on the ability of banks to deliver alternative payment options (including mobile banking) to customers and the rate at which they adopt such options (Odumeru, 2013). One of such alternatives is mobile banking. Available statistics show that there exists a huge growth potential for mobile banking in Nigeria and indeed Africa. According to statistics, 30% of the adult population (25.4 million people) of Nigeria has at least one bank account while 56.9 million adults are unbanked (UNCTAD, 2012). Out of the 23 banks in Nigeria today, virtually all of them offer m-banking services. Services on offer on most m-banking platforms include: account alerts, account balances update and history, customer services via mobile, bill payments, fund transfers and transaction verifications. Despite the huge potentials for the success of mobile banking in Nigeria, the rate of usage still low compared with what is obtainable in similar developing countries in Africa and Asia. Studies show that Kenya, South Africa, India and Botswana have a higher rate of usage of mobile payment systems than Nigeria (UNCTAD, 2011). The study of factors influencing the use of mobile banking in Nigeria is also sparse in literature.

With the high volume of active mobile phones in Nigeria, m-banking has the potential of contributing greatly to the success of the cashless policy. It is therefore imperative to determine those factors that influence the rate of adoption of m-banking in Nigeria so as to guide policy design and implementation aimed at encouraging its usage. This article will also fill the existing knowledge gap on factors influencing the use of m-banking.

## 3.0 Review of Relevant Literature

Mobile Banking refers to provision of banking and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customised information (Tiware & Buse, 2006). However, technology development keeps expanding the range of services the mobile banking offers. The objectives of mobile services provided by banks are to enhance customer communication and information and customer convenience. They are also to help customers: conduct banking transactions, create customer centricity, and enrich mobile banking experience to non-banking financial services and building customer relationships. Other objectives are to: extract best advantage of technology, provide value-added propositions, generate revenue streams for banks, reduce banking transaction costs, achieve multi-channel advantage and automated banking services and support (Hogarth, Kolodinsky & Gabor, 2008; Vaidya, 2011).

### 3.1 Theoretical Framework

Several theoretical underpinnings have been used by previous studies to determine the factors influencing the acceptance and adoption of a new technology. Three of such theories are Rogers Diffusion of Innovation (DOI) Theory, Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM). The Diffusion of Innovation theory postulates that five key determinants influence the adoption of a new technology and all five are mediated by attitude of the adopter towards the new technology. These determinants are Relative Advantage, Complexity, Compatibility, Observability and Trialability of the new technology (Lee & Lee, 2000; Rogers, 2003). The

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Theory of Planned Behaviour on the other hand links belief with behaviour. According to the theory, Behavioural Intentions is a function of Attitude towards a Behaviour, Subjective Norms and Perceived Behavioural Control. Attitude towards behaviour is made up of two elements: strength of individual's beliefs and his/her evaluation of outcomes of the intended behaviour. Subjective Norms of the other hand comprises of strength of each normative belief and motivation to comply with the referent (Ajzen, 1985). Technology Acceptance Model asserts that the effects of the following factors are mediated by user attitude towards a new technology: Perceived Usefulness and Perceived Ease of Use (Kamakodi & Khan, 2008; Chuttur, 2009). This paper adopts a modified version of TAM as proposed by Vankatesh and Davis (2000) with some further modification to suit the context of mobile banking.

### 3.2 Empirical Framework

Research into the adoption of mobile banking is sparse in literature (Suoranta, 2003). However, the following are worth mentioning. In a study conducted to determine factors influencing the adoption of m-banking in Finland using Rogers' Diffusion of Innovation Theory as framework, it was discovered that relative advantage, compatibility, communication and trialability drive m-banking usage, while complexity and risk of using m-banking yield no support as barrier to adoption (Suoranta, 2003). However, the methodology adopted is simplistic and the outcome might be different if conducted in a developing economy of Asia or Africa

Kim, Shin and Lee (2009) conducted a research to determine the reveal the mechanisms associated with the initial formation of people's trust in mobile banking and intention to use the service. The study determined the effects of four antecedent variables (structural assurances, relative benefits, personal propensity to trust and firm reputation) on shaping a person's initial trust in mobile banking and its usage intention using a modified version of the DOI theory. The survey data were analysed using Structural Equation Modelling. The analysis showed that three variables (relative benefits, propensity to trust and structural assurances) had a significant effect on initial trust in mobile banking. Also, the perception of initial trust and relative benefits was vital in promoting personal intention to make use of related services. However, the reputation as a firm characteristics variable failed to attract people to mobile banking. We intend to verify whether the assertions of these researchers applies to the Nigerian environment

Yang (2009) investigated factors associated with adopting and resisting mobile banking technologies among university students in Taiwan. Adoption factors determined in the study includes the belief that mobile banking helps fulfil personal banking needs, provides location-free conveniences, and is cost effective. The primary factors associated with resistance which was discovered included concerns over system configuration security and basic fees for mobile banking web connections. The study however overlooked the influence of ease of use and perceived risk, which has been clearly identified by previous authors as key factors determining adoption of mobile banking.

Using a modified version of TAM, Khraim, Shoubaki and Khraim (2011) investigated the determinants of m-banking adoption in Jordan. Data were collected and analysed using a 22-items questionnaire to collect data from 450 respondents and Pearson Correlation. It was discovered that self efficacy, trialability, compatibility, complexity, risk and relative advantage significantly determine mobile banking adoption. However, the statistical tool in this study is simplistic in addition to the fact that previous study had shown that the relationship between these determinants and usage intention is mediated by user attitude to m-banking all of which are addressed in our study.

Govender and Sihlali (2014) studied the factors affecting the intention to use m-banking by university students in South Africa using a modified TAM as framework. Factors that were considered include: Perceived Ease of Use, Perceived Value, Trust, Perceived Ease of Adoption, Usage Behaviour and Intention to Use. Using multiple regression for data analyses, it was discovered that 42% of the listed variables determine intention to use m-banking by university students. We intend to improve on this study using Structural Equation Model while adding more variables which will be highlighted later.

In a study of user adoption factors in m-banking, Yao, Liu and Yuan (2013), grouped the determinants of mobile banking adoption into: Trust and Distrust. Using a literature survey approach, the authors drew their conclusion from the strengths and weaknesses from TAM, DOI and TBP. However, the study is devoid of any clear empirical evidence.

Iddris (2013) investigated the perceived barriers to m-banking among customers in Ghana. He also determined the effects of demographic characteristics such as age, income level and marital status on m-banking usage. Collecting data from 189 in the Ashanti area of the country and adopting descriptive statistics and Chi-square test to analyse same, he discovered that majority of the respondents do not use m-banking. Reasons mostly advanced by respondents include: poor telecommunication facilities, perceived high transaction cost, perceived user unfriendliness, and preference for traditional means of banking.

Dzoghbenuku (2013) studied the diffusion of m-banking in Ghana using the DOI theory as framework. Data was collected from 550 undergraduate students that are mobile phone users and analysed using correlation and regression analysis to determine the effect of relative advantage, complexity, compatibility, perceived risk, observability, trialability and service satisfaction on adoption of m-banking. Results show a significant relationship between the independent and dependent variables. The gap in this study is the downplaying of attitude as a mediator in the relationship

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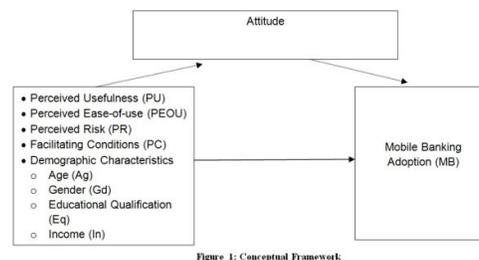
Lee, Lee and Kim (2007) investigated the adoption of M-banking using a modified version of TAM which incorporates perceived risk, trust. Structured questionnaire was distributed to 306 respondents in South Korea to collect data of the key variables. Using Principal Factor Analysis to analyse data and Structural Equation Modelling, perceived risk was found not to significantly determine m-banking adoption. However, perceived risk significantly determine trust; which in turn determines m-banking adoption. Perceived usefulness and ease of use were also found to significantly determine m-banking adoption.

Thulani, Kosmas, Collins and Lloyds (2011) studied the adoption of Mobile/SMS banking adoption in Zimbabwe from the perspective of banking services providers; banks. Data was collected from a sample of 15 banks and analysed using descriptive statistics. The study discovered that affordability and accessibility are the key drivers of mobile/sms banking in the country.

Crabbe, Standing, Standing & Karjaluo (2009) investigated the impact of social and cultural factors on m-banking adoption by examining the reasons for the adoption and non-adoption of mobile banking in Ghana. From a data obtained from 271 respondents in Ghana analysed using Principal Factor Analysis and SEM, it was discovered that social and cultural factors in the form of perceived credibility, facilitating conditions, perceived elitisation and demographic factors do play a significant role in adoption decisions. It has been found that elitisation of technology and services can be a positive influence for adopters whilst being a negative influence for non-adopters. In addition, perceived credibility and facilitating conditions also influence attitudes towards the technology. When these factors are added to a range of demographic factors, the impact of the social and cultural features of the context of studies can be seen as significant.

### 3.3 Conceptual Framework and Hypotheses

The table below depicts the conceptual framework for the study



The study adopts a modified version of TAM. TAM has some advantages over DOI and TPB in that it is arguably the most widely accepted of the three and it seeks to consciously explain intended behaviour across a wide range of end-user technology and user population (Srite & Karahaura, 2006; Chuttur, 2009). DOI theory on the other hand is more relevant in explaining adoption decisions at individual level (Crabbe et al, 2009).

The conceptual frame work adds key factors that are empirically proven in literature to affect mobile banking adoption to the determinants provided by Davis in TAM (Chuttur, 2009). This hopefully will improve the predictive power of the TAM model.

- Perceived Usefulness (PU) (Ki et al, 2007; Kamakodi & Khan, 2008; Chuttur, 2009; Yang, 2009; Crabbe et al, 2009)
- Perceived Ease-Of-Use (PEOU) (Ki et al, 2007; Chuttur, 2009; Yang, 2009; Crabbe et al, 2009)
- Perceived Risk; (Ki et al, 2007; Kim, Shin & Lee, 2009; Yao et al, 2013)
- Facilitating Conditions (Crabbe et al, 2009; Yao et al, 2013)
- Demographic Characteristics (Gefen & Straub, 1997; Iddris, 2013)
- Attitude (Ki et al, 2007; Chuttur, 2009)

#### 3.31 Perceived Usefulness (PU)

Previous research has shown that PU significantly determines usage of a new technology (Ki et al, 2007; Crabbe et al, 2007; Chuttur, 2009; etc). PU is the extent to which a person believes that using a particular technology will enhance hi/her job performance (Chuttur, 2009). In the context of mobile banking, items that measure PU includes benefits derived from using m-banking such as comfort and convenience, relatively low transaction cost to the customer and elitisation.

*H1: Perceived Usefulness does not significantly determine mobile banking adoption*

### 3.32 Perceived Ease-of-Use (PEOU)

It has also been established in literature that PEOU determines adoption of any new technology ( Vankatesh, 1999; Ki et al 2007; Chuttur, 2009; Crabbe, et al 2009). PEOU refers to the extent to which a new technology will be free of effort (Ki et al, 2007). Items included in this construct include: ease of download of m-banking applications, ease of usage, duration of effecting transactions using m-banking and the extent to which training and experience is required to use m-banking apps. However, studies have shown that as technologies become more user friendly and handy, the influence of PEOU reduces (Vankatesh, 1999; Crabbe, 2009)

*H2: Perceived Ease-of-Use do not significantly affect mobile banking adoption*

### 3.33 Perceived Risk (PR)

This describes the feeling of consumers about what they believe they stand to lose if they adopt mobile banking. Key items in this construct include Technical Risk, Privacy Disclosure Risk, Legal Remedies Risk and Reputational Risk. Technical risk takes care of the perception of customers as to whether m-banking platforms and apps cannot be manipulated or hacked by fraudsters or infected by viruses. Privacy disclosure risk accounts for the perception of bank customers on whether their personal information such as password, personal identification number, account number, account balances etc is secured while effecting transaction with m-banking. Legal remedied risk deals with the availability of legal protection in the event of suspected fraud or disagreement between users, banks and other third parties. Reputational risk considers risk that customers' bear as a result of the reputation of banks, mobile phone service providers, switch service providers etc.

*H3: Perceived Risk do not significantly affect mobile banking adoption*

### 3.34 Facilitating Conditions (FC)

This construct takes care of the perception of bank customers as to whether organisational and technical infrastructure exists to support the effectiveness and efficiency of m-banking services. Ki et al (2007) believe that that FC will help service delivery of m-banking. Items in this construct include perception of bank customers' organisational and technical capability of their banks and mobile telephone service providers to render effective and efficient mobile banking services.

*H4: Facilitating Conditions do not significantly affect mobile banking adoption*

### 3.35 Demographic Characteristics (DC)

The effect of key demographic characteristics such as Age, Educational Background, Gender and Income on the adoption of a new technology is well documented in literature (Gefen & Straub, 1997; Vankatesh, 1999; Putrevu, 2002; Suoranta, 2003; Tiwari & Buse, 2006; Kennickell & Kwast, 2008; Ki et al, 2007; Crabbe et al, 2009; Yao et al, 2013 etc). To enhance the predictive power of the modified TAM model proposed in this study, we include DC.

*H5a: Age does not significantly affect the adoption of mobile banking*

*H5b: Gender does not significantly affect the adoption of mobile banking*

*H5c: Educational Qualification does not significantly affect mobile banking adoption*

*H5d: Income does not significantly affect mobile banking adoption*

### 3.36 Attitude (At)

Attitude towards an object is an objective assessment of the characteristics of the innovation which lead to intention formation and usage (Ki et al, 2007). We propose that attitude to mobile banking plays a mediator role in the modified TAM – mobile banking adoption relationship (Kennickell & Kwast, 2008)

*H6: Attitude do not mediate the relationship between variables and mobile banking adoption*

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3.37 Mobile Banking Adoption (MB)

This is defined as the usage of mobile banking services on a regular basis.

4.0 Model Specification

This study adopts the Baron and Kenny (1986) approach to testing the existence of mediation between dependent and independent variables. Thus from the hypotheses above, the parameters of the following models will be estimated:

$$MB = \alpha_{11} + \beta_{11}PU + \beta_{12}PEOU + \beta_{13}PR + \beta_{14}FC + \beta_{15}Ag + \beta_{16}Gd + \beta_{17}Eq + \beta_{18}In \dots\dots\dots(1)$$

$$At = \alpha_{21} + \beta_{21}PU + \beta_{22}PEOU + \beta_{23}PR + \beta_{24}FC + \beta_{25}Ag + \beta_{26}Gd + \beta_{27}Eq + \beta_{28}In \dots\dots\dots(2)$$

$$MB = \alpha_{31} + \beta_{31}PU + \beta_{32}PEOU + \beta_{33}PR + \beta_{34}FC + \beta_{35}Ag + \beta_{36}Gd + \beta_{37}Eq + \beta_{38}In + \beta_{39}At \dots\dots\dots(3)$$

Equations (1), (2) and (3) represents each step in the Baron and Kenny (1986) steps of test of mediation as adopted in this study.

5.0 Methodology

A cross sectional survey research design was adopted in this study. Out of the over 25 million bank customers in Nigeria, 400 respondents were selected using convenience sampling method from the Lagos area. A structured questionnaire was designed and copies distributed to selected respondents to elicit data on the constructs highlighted in the conceptual framework and model specification. Constructs with only 2 possible responses; gender were measured using a two point scale. Age and Income on the other hand were measured using a 5-point scale with each point attached to each range. Other constructs were measured using a 6-point Likert scale with polar anchors: 1 standing for strongly disagree, 2 for disagree, 3 for partially disagree, 4 for partially agree, 5 for agree and 6 for strongly agree. Copies of questionnaire were distributed between June and September 2014. Cronbach Coefficient Alpha was used to test for consistency and reliability of measuring instruments. Data was analysed using multiple regression analysis and computed using SPSS 20.0 computer software.

6.0 Results and Discussion

Out of a total of 400 copies of questionnaire that was distributed, 295 were found to be useful representing 74% success rate. The table below shows a summary of demographic features of respondents.

Table 1: Demographic Features of Respondents

		Rank	Frequency	%	% of Adopters of M-banking
<b>Age</b>	20 – 30 Years	1	64	22	12.9
	31 – 40 Years	2	90	31	10.4
	41 – 50 Years	3	78	26	8.1
	51 – 60 Years	4	39	13	1.0
	Above 60 Years	5	24	8	1.1
<b>Income (Per Month in Naira)</b>	0 – 9,999	1	22	7	0.0
	10,000 – 49,999	2	82	28	3.1
	50,000 – 99,999	3	124	42	10.3
	100,000 – 499,999	4	41	14	12.7
	500,000 and above	5	26	9	7.4
<b>Education</b>	WASC/SSCE	1	46	17	0.0
	OND/A levels	2	71	24	2.4
	BSC/BA/HND	3	96	31	12.7
	Masters/Professional	4	59	20	13.6
	Doctorate	5	23	8	4.9
<b>Gender</b>	Male	1	156	53	20.3
	Female	2	139	47	13.3

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From the table above, the rate of adoption among respondent is at 33.6%. Also, m-banking usage is more common among young adults between ages 20 to 40 years with those above 60 years having the lowest adoption rate. The table also shows that m-banking adoption rate increase with age and education. Also, adoption rate is shown to be higher in men than women.

**Table 2: Cronbach Alpha Test Results**

Construct	Cronbach's Alpha	No. Of Items
Perceived Usefulness	0.81	5
Perceived Ease-of-Use	0.83	5
Perceived Risk	0.8	6
Facilitating Conditions	0.86	5
Attitude Towards Mobile Banking	0.73	4

From table 2 below, the Cronbach Alpha results are above 0.7, thus showing consistency and reliability of test instruments.

### 6.1 Test of Mediation Results

#### 6.11 Step 1

**Table 3: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.601(a)	.36	.19	.342

Predictors: (Constant), Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income. Dependent Variable: Mobile Banking Adoption

Table 3 shows an  $R^2$  of 0.36 showing that 36% of mobile banking adoption is determined by Perceived usefulness, Perceived Ease-of-Use, perceived Risk, Facilitating Condition and demographic characteristics.

**Table 4: Coefficients (a)**

Model		Unstandardised Coefficients	Standardised Coefficients	Sig.
		B	Beta	
1	(Constant)	2.31		.00
	Perceived Usefulness.	0.85	0.65	.00
	Perceived Ease-of-use	0.79	-0.49	.00
	Perceived Risk	-0.67	-0.41	.00
	Facilitating Conditions	1.1	0.91	.04
	Age	-0.73	-0.58	.01
	Gender	2.03	1.55	.37
	Educational Qualification	1.03	0.99	0.03
	Income	2.4	1.61	0.01

- Dependent Variable: Mobile Banking Adoption
- Independent Variables: Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income

Table 4 above shows that all 5 independent variables except Gender significantly determine mobile banking adoption at  $p < 0.05$ . Thus equation (1) becomes

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$$MB = 2.31 + 0.85PU + 0.79PEOU - 0.67PR + 1.1FC - 0.73Ag + 2.3Gd + 1.03Eq + 2.4I$$

6.12 Step 2

This step tests the relationship between the mediator variable (Attitude) on the independent variables.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.596(a)	.36	.21	.353

Predictors: (Constant), Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income. Dependent Variable: Attitude to Mobile Banking

From Table 5 above, 36% of attitude to mobile banking is determined by the independent variable.

Table 6: Coefficients

Model		Unstandardised Coefficients	Standardised Coefficients	Sig.
		B	Beta	
1	(Constant)	1.7		.00
	Perceived Usefulness.	0.56	0.32	.00
	Perceived Ease-of-use	0.39	-0.24	.00
	Perceived Risk	-0.21	-0.15	.00
	Facilitating Conditions	0.81	0.52	.03
	Age	-0.41	-0.22	.04
	Gender	1.05	0.82	.56
	Educational Qualification	0.86	0.43	0.0
	Income	0.97	0.48	0.03

- a. Dependent Variable: Attitude Towards Mobile Banking
- b. Independent Variables: Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income

The second step shows that all variables except gender significantly determines attitude towards mobile banking. However, the relationship between the independent variable is relatively lower than their relationship with mobile banking adoption. Equation (2) therefore becomes:

$$At = 1.7 + 0.56PU - 0.39PEOU + 0.21PR + 0.81PC - 0.41Ag + 1.05Gd + 0.86Eq + 0.97In$$

This confirms the fact that Attitude acts as a mediator between the independent variables and mobile banking adoption. However, the strength of mediation is determined by the 3<sup>rd</sup> step.

6.13 Step 3

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.356(a)	.13	.08	.452

Predictors: (Constant), Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income, Attitude. Dependent Variable: Mobile Banking Adoption

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From the above, 13% of the mobile banking adoption is determined by all independent variable when attitude to mobile banking is included as an independent variable.

Table 8: Coefficients

Model		Unstandardised Coefficients	Standardised Coefficients	Sig.
		B	Beta	
1	(Constant)	0.56		.00
	Perceived Usefulness.	0.31	0.2	.00
	Perceived Ease-of-use	0.26	-0.11	.00
	Perceived Risk	-0.10	-0.08	.04
	Facilitating Conditions	0.32	0.17	.04
	Age	-0.17	-0.06	.04
	Gender	0.55	0.18	.23
	Educational Qualification	0.17	0.12	0.0
	Income	0.59	0.2	0.0
	Attitude	0.12	0.07	0.1

- a. Dependent Variable: Mobile Banking Adoption
- b. Independent Variables: Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Gender, Educational Qualification, Income, Attitude to Mobile Banking

The above tests the relationship between the dependent variable and the moderator while using the independent variables as control. From it is clear that Attitude significantly determines Mobile Banking Adoption (at  $p < 0.05$ ) despite introducing control variables (independent variables). Equation (3) becomes:

$$MB = 0.56 + 0.31PU + 0.26PEOU - 0.1PR + \beta_{34}PC + 0.32Ag - 0.17Gd + 0.55Eq + 0.59In + 0.12At$$

The statistical analysis confirms that Perceived Usefulness, Perceived Ease-of-Use, Perceived Risk, Facilitating Conditions, Age, Educational Qualification and Income significantly determine Mobile Banking Adoption. This confirms the position of several researchers (Gefen & Straub, 1997; Vankatesh, 1999; Putrevu, 2002; Suoranta, 2003; Tiwari & Buse, 2006; Kennickell & Kwast, 2008; Ki et al, 2007; Crabbe et al, 2009; Yao et al, 2013 etc). However, contrary to the position of Gefen & Straub (1997), the impact of gender on mobile banking adoption is not significant. The table below shows a summary of hypotheses test result. Also, the relationship between PU, FC, EQ and IN and MB are positive while PEOU, PR and AG affect MB in the negative direction.

Table 9: Hypotheses Test Results

Hypotheses	$\beta$ Value	p Value	Results
Perceived Usefulness does not significantly determine mobile banking adoption	0.31	.00	Reject
Perceived Ease-of-Use do not significantly affect mobile banking adoption	0.26	.00	Reject
Perceived Risk do not significantly affect mobile banking adoption	-0.10	.04	Reject
Facilitating Conditions do not significantly affect mobile banking adoption	0.32	.04	Reject
Age do not significantly affect the adoption of mobile banking	-0.17	.04	Reject
Gender does not significantly affect the adoption of mobile banking	0.55	0.23	Accept
Educational Qualification does not significantly affect mobile banking adoption	0.17	0.0	Reject
Income does not significantly affect mobile banking adoption	0.59	0.0	Reject
Attitude do not mediate the relationship between Independent Variables and mobile banking adoption	0.12	0.1	Reject

7.0 Limitations

An obvious limitation of this study is its sample selection method. A more scientific sampling procedure may give different outcomes. Also, even though more of the results show a p value less than 5%, the presence of Common Methods Bias (CMB) cannot be overruled. In addition to this, larger samples or equal number of samples taken from other locations in Nigeria may yield different

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results. This is because as the commercial capital of Nigeria, the level of awareness about current trend in information technology is likely to be higher in Lagos than in any other part of Nigeria.

## 8.0 Conclusion and Recommendation

This study concludes that adoption rate of mobile banking increases with perception about its usefulness, Perceived Ease-of-Use and availability of facilitating condition. It also showed clearly that mobile banking adoption rate drops with when perceived risk increases. It also show that adoption rate of mobile banking reduces with age but increases with educational qualification and income of adopters. The implication of this is that the low rate of mobile banking adoption in Nigeria can only be addressed when relevant stakeholders focus attention on influencing the perception of bank customers on the usefulness, ease of use, recklessness and facilitating conditions for mobile banking in the right direction. Also, efforts should be made to promote the use of mobile banking among older bank customers in ways that they will understand, highlighting its numerous benefits while providing easy to use apps that run on all mobile communication networks without necessarily using the internet

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## Venture capital for Entrepreneurs: Case study of Kingdom of Saudi Arabia

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**Abstract:** The issue of getting finances for the small businesses and entrepreneurs is always been in debate and remain unresolved in the developing countries due to unavailability of qualified venture capitalists. The developing and emerging economies set the micro finance banks for this purpose, however, it is argued that the owner and entrepreneur faces many problems like collaterals, documentation, etc. This research focuses on the role of financial banks in promoting the small business and entrepreneurial culture in the Saudi Arabia in providing credit. The research applied a mixed methodology and at the first stage, qualitative data is collected and then the results of these structured interviews were used to construct a survey questionnaire for the quantitative analysis. The result of study shows that the levels of business cooperation and information sharing and quality of business have an important significance on the success of loan application. Furthermore, the results also support that the bureaucracy of bank in terms of loan documents requirement and loan evaluation procedure can make small business hesitate when applying for loans.

**Keywords:** Financial banks, Small and Medium Enterprises, Entrepreneurship, Saudi Arabia

### 1. Introduction

The effective and efficient supply of finance to the small business sector has been seen as one of the most important influence on its success. Different theories suggest that small business sector in evolving economies faces greater credit constraint than those in developed economies (Jane, S. Pollard, 2003). However, there are limited studies of credit gap for small businesses and entrepreneurs in the gulf countries. In this situation, a study of the nature of credit gap between commercial banks and small businesses/entrepreneurs is of great significance in terms of theoretical contributions and policy implications. However, in order to analyse the problem, the selection of a valid and accurate measurement is important to ensure the quality of research findings. But this is not a simple task and depends much on the possibility of information access, especially when the measurement is based on abstract and intangible constructs, such as the perceptions of bank manager and business owner's/ entrepreneurs points of view (Lawrence et al, 2000).

The purpose of this paper is to measure the credit constraint of small business/ entrepreneurs sector in the Saudi Arabia. Applying mixed data collection methods, the study focuses on the problem of bank finance access faced by small businesses/ entrepreneurs, which is one of the most important factors in determining the success of business. In the data collection phase, qualitative data was collected through the structured interview with bank managers. The findings of the structured interviews are used to construct and validate the questionnaire survey of small business owners in the second phase of data collection.

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## 2. Literature Review

The concept of market failure in economics denotes a situation in which goods or services are not made available to those demanding them at the lowest social cost (Jean and Jean, 2006). The market failure occurs, when the Pareto conditions fail. Cressy (2002) argued that funding gap is a phenomenon of market failure that can result in a related outcome, called credit rationing. It could be said that market failure of finance provision occurs when the funding supply and funding demand cannot be matched due to the malfunction of the capital market.

Generally, market failure in finance provision can arise from the behaviour of finance suppliers or finance demanders in market. Supply-side market failure in finance occurs as financial institutions reject the finance proposal for the reasons which are not related to the projected rate of return. In other words, market failure of finance provision occurs when finance is refused for the projects that can be expected to be profitable. The lender's main criteria usually relate to features of the project to be funded, including market demand, production cost, and management adaptability, rates of return and risk and uncertainty levels. In contrast, Demand-side market failure in finance provision occurs when firms cannot properly access the financial opportunities available due to lack of knowledge, poor management, and poor presentation of proposals. Furthermore, the problems of market failure in finance provision can be related to such commercial criteria as lack of record, lack of security for loan, poor business location, type of firm, industrial sector, type of entrepreneur, poor past financial record, rapid expansion and high level of risk (Alain Fayolle and Kiril Todorov, 2011). In this situation, information can play an important role in reducing the level of market failure in the credit market. Therefore, understanding of asymmetric information nature can reduce the information gap between lender and borrower, and this can result in reducing the level of credit finance gap for small business/ entrepreneurs in the capital market (Allen and Engert, 2007).

The current theories suggest that both small business sector in emerging economies and small business sector in mature market economies encounter the problem of finance supply due to the asymmetry of information. Muhsin and his colleagues investigate the causality between financial development and economic growth for Middle East and North African countries and found no causality between financial development and economic growth for all the measured financial indicators (Muhsin, Kar et al, 2011). However, the empirical studies show that the extent of finance gap caused by information asymmetry is likely to be greater for small businesses in transition economies than those in mature market economies (Vos, E et al, 2007). The reason for this is that in mature markets the capital market in terms of debt and equity finance is better developed and supported by an effective legal framework. This can reduce the level of information problem and increase the reliability level of information exchange between partners in the capital market. Additionally, it is clear that the development of supporting market institutions in developed economies can effectively help small businesses to get more opportunity to access different sources of finance than those in transition (Smallbone & Welter, 2001) and developing economies (Aryeetey, 2008), and the high level of development of banking system can also reduce the level of asymmetric information in the credit market.

Unlike small business sector in developed market economies, small businesses in transition and developing countries operate their businesses in an ineffective supporting environment because of the lack of effective legal framework, poor information transparency, bureaucracy and corruption, but lack of finance can be seen as the most serious problem. Small business sector in Saudi Arabia is not an exception, the large majority of small businesses face the shortage of finance for foundation and development, but they find it difficult to access credit fund from commercial banks. Types of finance rather than bank credit are nonexistent or infant in the capital market. Information asymmetry and the attitude of state commercial banks toward private sector; particularly small business sector can create a major barrier for small businesses to access finance to support their foundation and future growth (Webster, 2009).

Much evidence suggests that the private sector, especially small business, plays a dynamic role in many emerging countries as they have moved from central planning to market economies. However, behaviour of small business sector has not been well-understood yet, especially in Saudi Arabia market economies (Landier, A. and D. Thesmar, 2009). It is believed that small business sector in Saudi Arabia encounters more economic, institutional and legal obstacles than those in mature market economies in terms of finance access, legal and regulatory restrictions, poor infrastructure, and shortage of managerial and technical expertise. Therefore, it is important at this stage to analyse these issues and collect the both theoretical and empirical evidences.

## 3. Qualitative Approach: Structured interview

The qualitative method is used when the researchers wish to be closer to organisational members in order to gain the sort of insights into people and situations they require for their research (Silverman, 2011). Generally, interpretivism researchers use qualitative method to understand the way people construct their reality. On the other hand; positivism researchers also use qualitative method in data collection phase in order to gain greater understanding of their studies. The label 'qualitative interview' has been used to describe a broad range of different types of interview, from those that are totally non directive or open to those that are prepared as a list of questions that interviewers intend to ask in the interview. In fact, depending the purpose of the research and related information required by analysis in the research, interviews can be in forms of structured interview (standardised), unstructured interview (non-standardised), and partially-structured interview (Silverman, 2011). The structured interview is design to collect the same data from each respondent in the research sample. In structured interview or partially structured interview, the interviewer prepare the list of

question or interview guide depending on the purpose of data collection in order to direct the interview on a path consistent with the purpose of the research.

The interview guides can provide the topic or subject area that the interviewer can feel free to explore, probe and ask question (Michael Quinn Patton, 2001). Furthermore, the interview guides can be developed more or less relying not only on the researcher's ability to address and specify the important issues, but also on the limited time available and particular situation as the interview is carried out. Through probes, follow-up questions and attention to non-verbal cues, the researcher can validate the data collected. Hakim (1987) argued that interview technique shows quite good validity in term of research strategy. It provides more complete and more accurate information than other techniques. However, this method also shows the limitation because the subjective bias of the interviewer can have an influence on the interpretation of the data collection, but this limitation may be more likely with the unstructured interview than with structured interview. In this study, a structured interview is carried out to collect qualitative data from the commercial bank managers in order to serve the purpose of constructing and validating the questionnaire in the next phase of quantitative data collection. The interview guide prepared in which the major issues or questions of the research are able to be addressed and asked in the interview within time and setting limitations.

To help construct proper questions in the survey questionnaire, fifteen structured interviews of local commercial bank managers have been carried out. Together with issues mentioned in current theories, the guidelines of structured interview focussed on such following critical problems that might hinder the possibility of small businesses accessing bank credit as business cooperation with bank, quality of business, transparency of business information, quality of bank services, bureaucracy of commercial bank, property rights and equality of credit access. Each interview lasted approximately one hour and a half in average, and the interviews were conducted with the credit managers of the local commercial banks, and the key results of the interviews can be summarised as follows:

- The credit managers interviewed agreed that collateral was a key issue in evaluating loan application, and most small businesses used land and houses as collateral for their loan application at local commercial banks. Loan applications were only considered by credit officials when the documents that confirm the legal possession of collateral were recognised by local authorities. Managers were aware of the problems created by inadequate specification of property rights, especially as a manager explained that the determination procedure for property rights was complicated and bureaucratic. Furthermore, the regulations are brief, unclear and ambiguous. As a result, it takes so much time, expenses and efforts for small business owners to get the certificate that approved their own legal possession of assets. In case of failure to submit the legal documents that prove legal possession of property, or even the determination of legal possession of assets in progress, commercial banks have to reject loan applications. It is likely that when the determination procedure of legal property rights is simplified, the possibility of credit access for small business can be increased significantly.

- Bank relationship can be discussed from both sides in term of quality of bank services and business cooperation with bank. Generally, managers noted that such transaction as bank loan is much dependent on information between two partners in the contract, and they recognised that information plays an important role in the loan evaluation process. A better understanding and information exchange between local commercial banks and small businesses can improve the quality of information and increase the reliability on the information of business performance and financial statements, and as result this can reduce the risk of bank loan. However, the managers admitted that the relationship between commercial banks and small businesses is far in terms of business cooperation and information sharing. Additionally, a manager noted that a large number of young small businesses start their businesses with unclear purposes, strategies and visions, and especially they have no previous transactions with bank. Therefore, banks have no any evidence of their credit histories, as a result without loan securities; their loan applications are being rejected. Moreover, managers also recognised that until now there was no information centre where the credit transactions of the businesses was recorded, so banks could share information of business credit records. And therefore asymmetric information problem forced commercial banks to protect themselves by rejecting applications without loan securities, a credit manager of local commercial bank commented.

- In general, managers interviewed agreed that the main objective of state commercial banks was profit, and provided credit to all economic sectors in economy. However, they admitted that state commercial banks had more favourable conditions for the state sector when loan securities were not a compulsory requirement. A manager explained that it was quite understandable that both legal and working capital for state commercial bank's activities came from state budget, but the state sector contributed a high share in total national gross domestic product and budget revenue as well. In other words, it could be said that both state enterprise and state commercial banks got the subsidies from the state budget. Under condition of soft budget constraint, state commercial banks had to follow the administrative commands from local authorities to offer loan proposed by state enterprises without any securities. In case of project failure, state commercial banks could cover their losses by additional subsidies from local state budget. But the situation was different when state commercial banks deal with loan application from the private small businesses. In case of project failure, the commercial banks lost their capital, the responsibility of bank managers was considerable, and there was no subsidy for these losses. That was the reason why state commercial banks had to be much more cautious when deciding to lend money to private sector,

especially small businesses, and the documents and other requirements for loan were also much higher and stricter when compared with the state enterprises, a credit manager explained.

#### 4. Quantitative Approach: Survey Questionnaire Development

The preliminary questionnaire of the survey reflecting the credit constraint of small business in terms of loan success or failure was developed from the current theories, database publication and results from the structured interviews of local commercial bank managers and directors. The major contents of the questionnaire answered by small business managers and owners related to such following issues as property rights; quality of bank services; business cooperation with bank; equality in accessing bank finance; quality of business; transparency of business information; and bureaucracy of bank.

The target population of research is small businesses with less than 50 employees that have been trading at least one year in Saudi Arabia. The intention of the survey was to collect data from a sample of small businesses considered to have transaction with local commercial banks. The research sample focuses on the private small businesses operating mainly in manufacturing, trading and service industries that have registered their businesses with the Chamber of commerce. The survey questionnaire is designed and sent to the owners and managers who involve in the investment project or in transactions with the local commercial banks for loans in the small businesses.

Basing on the list of private companies that are monitored by the Chamber of commerce, there were about 687 questionnaires to be distributed to the owners and managers of private small businesses in Saudi Arabia through email. Many emails were bounced back as perhaps may be the incorrect email address or old email address. Total 276 questionnaires collected were useable for the analysis, many questionnaires were discarded from analysis because these questionnaires were not fully completed or the major important parts of questionnaires were missed or the respondents blindly filled in the questionnaires without looking at the order and logic of the answers.

A regression model analysis is used to express the causal relationship between the credit constraint of small businesses, regarding as dependent variable and factors that hinder the possibility of small businesses in obtaining bank finance, regarding as independent variables. The credit constraint can be measured by small business owner's perception on the success or failure of loan application submitted to local commercial banks by small businesses. It means that dependent variable is designed in form of dummy variables with 1 for success of loan application and 0 for failure of loan application. Basing on current theories, two groups of hypotheses were developed and described below, including internal and external influential factors on the possibility of small businesses in obtaining bank finance. The first is composed of internal factors regarding to business cooperation with bank, quality of business and transparency of business information. The second concerns external factors, known as quality of bank services, bureaucracy of bank, property right, equality of credit access.

1. The better the business cooperation with bank, the higher the level of credit access for small businesses;
2. The higher the quality of business, the higher the level of credit access for small businesses;
3. The higher the transparency of business information, the higher the level of credit access for small businesses;
4. The simpler the determination of property rights with local authority agents, the higher the level of credit access for small businesses;
5. The higher the quality of commercial bank services, the higher the level of credit access for small businesses;
6. The higher the equality in accessing bank finance among different economic sectors in economy, the higher the level of credit access for small businesses;
7. The lower the bureaucracy of commercial banks, the higher the level of credit access for small businesses;

Together with two groups of hypotheses, a regression model was also developed:

$$Y = \beta + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7$$

Where:

$Y$ : Failure or success of loan application submitted by small businesses to bank

$X_1$ : Business cooperation with bank

$X_2$ : Quality of business

$X_3$ : Property rights

$X_4$ : Quality of bank services

$X_5$ : Equality in credit access

$X_6$ : transparency of business information

$X_7$ : Bureaucracy of bank

To deal with a non-metric dependent variable, known as binary or category, it is suggested that a logit regression should be used rather than standard linear regression (Hair et al, 2010). This analysis process is described in details in the section of empirical analysis.

A factor analysis was performed to reduce the original set of variables and created a new set of variables in form of new factors. These new factors with eigen-value equal or greater than 1 were selected and named as property rights; quality of bank services; business cooperation with bank; equality in accessing bank finance; quality of business; transparency of business information and bank bureaucracy.

**TABLE I: Factor Analysis**

Construct Name	Explanation	Reliability
Property right	Extent to which respondents behave that property right are well developed	.704
Quality of ban services	Extent to which respondents behave that quality of bank services are well developed	.949
Business cooperation	Extent to which respondent behave that business cooperation are well developed	.876
Equity in credit access	Extent to which respondents behave that equity in credit access are well developed	.779
Quality of business	Extent to which respondents behave that quality of business are well developed	.737
Information transparency	Extent to which respondents behave that bank bureaucracy are well developed	.716
Bank bureaucracy		.859

Due to the binary or categorical dependent variable, 1 for loan success and 0 loan failure of small businesses, it is suggested that logistic regression should be used in order to examine the correlation between the dependent variable and independent variables in the regression model (Hair et al, 2010). In this process, the new set of variables mentioned in Table 2 was used as inputs for logistic regression in the second phase of analysis. The major results of the logistic regression, including the coefficient value, wald statistic value and significance test for difference of means of the regression model and results of hypotheses testing are organised in the Table 2

**Table 2: Logistic Regression Analysis**

Variables	Coefficient	Wald statistic	p-value
Business cooperation	.243	53.694	.00
Quality of bank services	.265	28.367	.00
Quality of business	.187	14.756	.00

Bureaucracy of bank	.230	11.270	.00
Property rights	-.064	1.232	.23
Business information	-.028	.232	.63
Equality of credit access	-.171	3.770	.05

*Property right:* The result from analysis shows that there is no evidence to suggest that that respondents' perception of the effectiveness of property rights have a significant impact on the capability of small businesses to access bank finance ( $p > .05$ ). It means that the result doesn't support the hypothesis. This can be explained that not only business owners, but also normal asset owners have difficulty in registering their properties with local governmental agents, so there is no distinction between people who are great constrained and those who are not. In fact, the property rights, private ownership and asset transferring rights are defined and protected in law book. Moreover, the individual and business assets are freely transferred on the market, and the prices of assets are also determined by the market factors. The problems for property right registration take root from the administrative bureaucracy, and it could only be improved when local authorities apply a one-stop administration procedure in order to simplify this process.

*Quality of bank services:* The test result shows a strong significance at level of p-value less than 0.01 (.00). The evidence suggests that quality of bank services has a strong influence on the level of loan application success submitted by small businesses. In other words, the test result strongly supports the hypothesis. Further examination of the mean values of the variables that comprise overall quality of bank services shows that the credit officials have limited understanding of business in term of market and industry knowledge. And the banking services, such as type of loan or means of application are also limited. Small businesses have difficulty in accessing long-term loan for their growth expansion or technology innovation that requires a longer time to get back the investment capital. In addition, small businesses are also at disadvantage when bank evaluate their collaterals; therefore many of small businesses could not get enough fund for their needs because the real value of assets was far away from the evaluation value made by bank. In reality, small businesses face higher requirements of loan application documents and securities, but lower probability of loan approval that leads to the higher ratio of loan failure for small businesses. The result also suggests that it is likely that there is still an ideological gap of state commercial banks when dealing with small business loan application in terms of less amount of loan approved than applied and more documents required than necessary in compared with state or foreign-invested sectors.

*Business cooperation with bank:* the evidence from the test supports that the business cooperation with bank has an influence of on the success of small business loan application when the p-value is lesser than 0.01 (.00). The result also strongly supports the hypothesis. It is recognised that the level of business belief on bank and versus are quite questionable. Further examination of the mean values of the variables which comprise overall business cooperation with bank recognises that small businesses do not believe in bank officials because they state that business information, such as information related to performance, investment or finance can be misused by credit officials and in this case that can harm small business benefits. It is clear that while the level of cooperation between two partners is low, the risk for loan failure and the cost for loan transaction are likely high. As a result, without fulfilling successfully requirements of loan security, small businesses fail to access bank credit.

*Equality in credit access:* As discussed above, there is likely to be an ideological gap in offering bank finance from the state commercial bank to small business sector in comparison with state sector. The result of test shows a significance on the equality in supplying bank credit for small business sector in comparison with other economic sectors in national economy, it is significant at level of p-value less than .05 (.05) and this result supports the hypothesis. It can be seen that small business sector is likely to have more difficulties in obtaining bank finance than other economic sectors. The inequality of credit access can be described by the high volume of loan failure or limited credit access in terms of higher loan security requirements, difficulty in obtaining long-term loans, disadvantage at collateral evaluation, longer time for loan evaluation procedure and less amount of loan acquired than business need.

*Quality of business:* The result showed that the quality of business had a strong impact on the success of small business in accessing bank finance. It is significant at level of p-value less than .01 (.000), and the result strongly supports the hypothesis. Further examination of the mean values of the variables which comprise overall quality of business suggests that such small businesses had high growth rate in both revenue and profit can have more opportunity to get the credit fund from bank. Furthermore, the debt-equity ratio in the capital structure of the business also had influence on the level of loan success, the lower the debt-equity ratio in the capital structure, the higher the probability of bank loan success. The result also shows that if the flow of information exchange between bank and small business was improved better, the chance for small business to access bank finance was higher. In other words, if bank had more

information related to the business performance, especially accounting and financial information, the credit gap can be reduced between small businesses and commercial banks.

*Transparency of business information:* As discussed, information plays an important role in the success of loan transaction between small businesses and commercial banks. However, surprisingly there is no evidence from respondent's perception to suggest that the business information transparency had influence on the ability of small business loan application success. It means that the result doesn't support the hypothesis. This can be explained that the level of mutual belief between the commercial bank and small business is quite far, and the cost of information collecting for lending decision is also so high, so commercial banks have to apply a strict strategy of loan security toward small business, and this makes small business feel discriminated in accessing bank finance. Furthermore it is quite understandable for bank strategy that in an imperfect market in terms of lack of institutional market support, shortage of legal framework and asymmetric information problem, the bank have to reduce the risk for loan by requiring higher loan securities. Therefore, business information cannot play an essential role, regarding as an assurance in loan evaluation process. As a result, although small businesses that have a potential project and are willing to share their information with bank, without collaterals or loan guarantee their loan applications are rejected.

*Bureaucracy of bank:* The result showed a strong significance of bureaucracy of bank on the success of small business loan application with p-value less than .01 (.001) and this result strongly supports the hypothesis. Further examination of the mean values of the variables which comprise overall bureaucracy of bank suggests that the procedure for loan application is so complicated and the application documents required are overlapping or unnecessary. In some cases, bank is not interested in the small business loan application and credit need. It can appear that when state commercial bank is obtaining 70 percent of market share in the credit market, and its main customer is the state enterprises. Together with soft budget constraint, the state commercial banks are likely to be reluctant to lend money to the small business sector, which belongs to the private sector in the economy. Therefore, the state commercial banks might require higher level of loan securities and more application documents from small businesses when compared to state sector. And the evaluation procedure usually lasts longer, but the amount of loan accepted is likely much smaller than the original value applied by small business.

## 5. Conclusions

This Research applied a mixed methodology in measuring the credit constraint of small business sector in Saudi Arabia. In the study, together with current theories, the qualitative data collected from the structured interviews of bank credit managers in the first stage is used to construct questions in the survey questionnaire of the second stage. In the sequential design, the results from the survey of small business owners and managers can provide a significant insight of credit constraint faced by the small business sector by reflecting the perception of both commercial bank and small business. The findings of study contribute not only the current theories, but also policy implication as well. Furthermore, the results of the study also help researcher produce a deeper and more reliable results in evaluating the nature of the credit constraint faced by small business sector in the credit market in transition economy.

The result of study shows that the levels of business cooperation and information sharing and quality of business have an important significance on the success of loan application. It is obvious that asymmetric information can make the credit gap worse. When the commercial banks have not enough information about small business or it is quite costly for collecting such information, the bank behaviour in this case is to require higher loan security that can lead to the higher failure ratio of loan application from small business. It can be said that the higher the level of business cooperation and information sharing and quality of business, the higher the level of loan success. Furthermore the result also supports that the bureaucracy of bank in terms of loan documents requirement and loan evaluation procedure can make small business hesitate when applying loan for state commercial banks. In addition, the high level of collateral requirement and the method of collateral evaluation are disadvantageous for small business. The bank credit officials' competence in terms of knowledge and understanding of the business market and industry are still limited so they cannot give useful advice or help the small business in case of need. Moreover, bank products are so plain in terms of types of loan that small business has limited choice to get credit loan, especially long-term loan. Finally, findings of study also indicate that it is likely in case of soft budget constraint, state commercial banks seem to hesitate lending to the private sector rather than state sector, and it appears that there is an ideological gap in manager's mind when deciding to offer loan to small business.

In conclusion, the findings from both quantitative and qualitative analysis support that the credit gap exists between small business sector and commercial banks in terms of technological and ideological contexts in Saudi Arabia. By using mixed methods with multiple data sources to measure the same problem of credit constraint, the findings of study can be more valid and reliable in case of better understanding of the credit gap in supplying credit for small business sector in an emerging economy. It is undoubted about the economic role of small business sector in transition economies; therefore basing on the result of study, it is likely to be wise for policy makers to make a change of the current situation of credit supply in forms of banking reform and governmental funding support in

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order to meet the credit demand of private sector, especially small businesses, and simulate the foundation and development of this sector in the national economy as a whole.

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## A Cloud-Based WBAN System for Health Management

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**Abstract:** *In this paper, a novel cloud-based WBAN health management system is introduced to. This system can be used for people's health information collection, record, storage and transmission, health status monitoring and assessment, health education, telemedicine, and remote health management. Therefore it can provide health management services on-demand timely, appropriately and without boundaries.*

**Keywords:** cloud; Wireless Body Area Network; IoT; health management system

### I. INTRODUCTION

With the improvement of people's living standard, people pay more attention to their health. But the aging population has become a trend all over the world, old people easily suffer from diseases such as diabetes, hypertension and cardiovascular and cerebrovascular disease. In the meantime, young and middle-aged patients with chronic disease are growing because of the rapid pace of life, the huge working pressure and the unhealthy lifestyle. According to the report published in 2013 by Chinese center for disease control and prevention, there are about 330 million hypertensive patients and 100 million diabetic patients in China, which have become the number one killer to Chinese people. Health management issues are facing a tremendous challenge.

Nowadays, information and communication technology are gradually entering the health service field. The health management applications for a large population, based on the combination of wireless body area network (WBAN), broadband mobile communication and cloud computing, are made possible. To sharply reduce the costs of health and medical treatment, to change the uneven allocation of medical resources and to improve the health care, developing digital medical technology turns out to be an important method. There are a lot researches on wireless body area network technology, cloud computing technology, health assessment system, telemedicine and home-care model at home and abroad, which have put forward a number of innovative theories and applications.

In this paper, a novel health management system is introduced which integrates wireless body area network, cloud computing, the Internet of things and other advanced information technology. This system can be used for people's health information collection, record and transmission, health status monitoring and assessment, health education, telemedicine, and remote health management. Therefore it can provide health management services timely, appropriately and without boundaries. The remainder of this paper is organized as follows. Section 2 presents an overview of the different researches in this field. In Section 3, we give a brief introduction of the technologies that is related to the sensor-cloud system. Section 4 presents a detailed description of the health management system. The conclusion and future work are shown in Section 5.

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## II. RELATED WORK

Firstly, a number of the largest IT corporates, such as IBM and Microsoft, propose some schemes for the digital health management based on cloud computing. IBM with ActiveHealth Management has created a new cloud computing and “Collaborative Care Solution” to help the doctors and patients get the health information which they need from the cloud and to improve medical service quality and cut costs [1]. Microsoft introduces a health management application platform for the individual and family, which called “HealthVault” [2]. This system is mainly used to share patients’ electronic medical record (EMR) with hospitals and doctors in order to increase efficiency. In addition, there are many institutions and researchers working on the digital health management system. Carlos Oberdan Rolim et al. [3] propose a solution to automate the process from data collection to information delivery by using “sensors” attached to existing medical equipment which inter-connected to exchange service. Their proposal is based on the concepts of cloud computing and wireless sensor networks. Then the information becomes available in the “cloud”, from where it can be processed by expert systems and/or distributed to medical staff for analysis. Upkar Varshney [4] presents pervasive healthcare, wireless networking solutions and several important and interesting research problems about the health monitoring system. The pervasive healthcare applications include pervasive health monitoring, intelligent emergency management system, pervasive healthcare data access, and ubiquitous mobile telemedicine. The wireless networking solutions included use of wireless LANs, ad hoc wireless networks, cellular/GSM/3G infrastructure-oriented networks and satellite-based systems. However only some related concepts are proposed without real-life implementation. B.Eswara Reddy et al. [5] focus on the design of a Cloud framework for Health Monitoring System (CHMS). The system collects patients’ health data which can be stored in a Cloud information repository. This facilitates the data analysis using services hosted in the Cloud. Sudhamony et al. [6] propose a system which provides telemedicine and tele-Health services for cancer-care delivery in India. These services are based on Oncology Network (ONCONET), which can be utilized not only by doctors but also other researchers, professionals, decision makers to reduce the miseries of cancer patients. Jones et al. [7] propose an architecture for mobile health services based on body area networks. It focuses on defining a generic mobile solution which can be adapted to different clinical applications. An adaptive communication middleware for monitoring heart-patients at home is being developed by the operating systems group at Hasso-Plattner-Institute which is involved in the telemedicine research project Fontane [8]. UbiMon [9] designs a platform for patients’ monitoring, which implant sensors into patients’ bodies to get vital data. This platform uses nodes to carry out the acquisition, processing, and storage tasks. Hiroshi Nakajima et al. [10] establish a framework of Systems Health Care by employing the tools of Index, Criterion, and Causality. Cheng and Zhuang [11] implement a Bluetooth-enabled in-home patient monitoring system, making early detection of Alzheimer’s disease easier. A medical practitioner is able to determine whether a target patient is developing Alzheimer’s disease based on the movement pattern of the patient. A case study shows that this in-home patient monitoring system is feasible and practical in real-life application. Chen et al. [12] propose a novel e-healthcare management system based on the introduction of encoded rules which are dynamically stored in RFID tags, and explain how it can be employed to leverage the effectiveness of existing ones. Yang Xiao et al. [13] provide a comprehensive survey about wireless telemedicine including relevant wireless technologies, applications and research issues. A. Redondi et al. [14] design a module called LAURA which provides patient location, tracking and monitoring services in nursing institutes through a WSN. This system is composed of three functional blocks: a location and tracking engine; a personal monitoring module; a wireless communication infrastructure to deliver the information. A health monitoring and indoor localization system based in a shoe-mounted sensor module is presented by C. Mariotti et al. [15]. The shoe sole measures the body temperature which includes an NFC (Near Field Communication) technology. And this platform can be extended to other sensors applications in order to monitor the sport performances of the users. José-Fernán Martínez et al. [16] present some feasible e-health application scenarios based on a WSN: one is for firemen/women monitoring, and the other one for sports performance in an indoor scenario as a gymnasium. This system acquires the physiological data from a Bluetooth commercial device. And the system can be adapted to a wide variety of e-health applications with minimum changes and the user is able to interact using different devices.

Different from the above works, the health management system in this paper has completed integrating nearly all health applications into a whole system. Several latest technologies, especially the cloud computing and Internet of things technologies, have been applied to this system. It makes large-scale deployment and mass data storage and processing possible, not just a theoretical study or lab test in small scale.

## III. Integrated Technology

This paper mainly involves three latest technologies which are integrated seamlessly in one single platform. These are WBAN to collect and transmit health data, a cloud service for data storage, processing, and distribution and IoT (Internet of Things) technology.

3.1 WBAN (Wireless Body Area Network). A WBAN consists of multiple sensor nodes, and each node can sample, process and communicate one or more vital signs (heart rate, blood pressure, oxygen saturation) or environmental parameters (location, temperature, light). Typically, these sensors are placed strategically on the human body as tiny patches or hidden in users’ clothes allowing ubiquitous health information collecting and monitoring. By using WBAN, people can communicate with some portable electronic equipment (such as PAD, mobile phone) and synchronize the data employing Bluetooth technologies. Furthermore, WBAN can be a part of the whole communication network with other communication networks such as WIFI and mobile Internet. And then it can communicate with any terminal (such as PC, mobile phone, PAD) just on the network [17]. WBAN technology helps collect health data and deliver them to the “cloud”.

3.2 Cloud. Cloud computing service refers to a variety of applications delivered as services from the datacenters. The advantage is that service providers enjoy greatly simplified software installation and maintenance and centralized control, and an end user can access the

service “anytime, anywhere”, can share data and collaborate with other more easily, and can keep their data stored safely in the infrastructure [18]. Specific to our health management system, after receiving people’s health data, the cloud computing platform will store them, and update them when new data comes. The data can be accessed “anytime and anywhere” from the cloud by the owner and his/her authorized doctors or family members. At the same time, the health management system running on top of the cloud infrastructure facilitates the analysis of the personal electronic health record and identifies some high-risk person who might develop a number of specific diseases using a number of mathematical models. Finally the cloud health management system will send an alert to the doctors or health-care professionals for immediate actions based on the results of the data analysis [5].

3.3 IoT (Internet of Things). Sensors, motes, Wireless Sensor Networks, semantic middleware architecture, ontologies, etc. are part of the Internet of Things, have already become a very popular research topics. The number of applications based on the IoT has boomed in recent years. And these applications have some unique characteristics. They are autonomous in their data capture patterns, have event transferring capabilities and provide strong interoperability or network connectivity [16]. Due to these specific features (ubiquity, pervasiveness, miniaturization of components, etc.), it makes the health monitoring and management “timely” possible.

#### IV. Health Management System Based on Cloud

The overall health management system based on cloud computing and WBAN includes three different logic layers: hardware, software and service shown in figure 1.



Fig. 1. Three different layers of health management platform

##### 4.1. Hardware layer

The hardware layer has multiple functionalities: terminal, channel and cloud.

The terminal includes a large number of sensors, such as blood pressure monitor, digital Oximeter, the digital ECG monitor and so on. It is used to collect people’s daily health parameters. After collecting health information by these sensors, the information then can be transferred to some gateway such as intelligent mobile phone and computers through WIFI, Bluetooth or RFID. And the gateway can forward the data to the cloud computing data center via the Internet or 3G or the private network. Figure 2 describes the hardware layer of the health management system, which is a foundation for upper software layer.



Fig. 2. The hardware layer of the health management system

##### 4.2. Software layer

The software layer has been implemented in two different Operating Systems: one is conventional desktop version based on Windows and another is mobility version based on Android.

###### 4.2.1. Desktop version

The Cloud health management system includes six subsystems, which are electronic health records system, Health Information Collection System, health risk assessment system, health intervention system, health education system and telemedicine system shown in Figure 3. Moreover, an Internet of Things system for health is part of the overall platform with the sensors for information

collection. The interfaces of the platform follow the technology and industry standards at home and abroad, and they can be interconnected. Next, the functions and services supplied by this platform are introduced in detail.

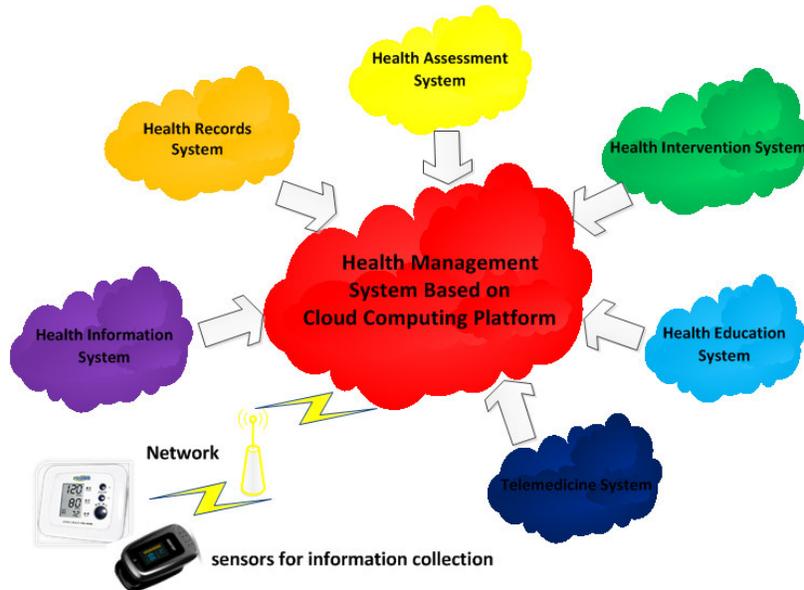


Fig. 3. The architecture of software layer in the health management system

**A. Electronic Health Records System.**

This system is a large-scale database designed and implemented based on the "Basic framework and data standard for electronic health record" authorized by the Chinese national health ministry. It contains the person’s basic information, the person’s diseases record and the abstract of his/her health problems, and the person’s main health service records within his/her life cycle shown in Figures 4 and 5. In addition, the system can collect the real-time health data generated by the health information collection system which will be described in the next section. Therefore a person owns the comprehensive and centralized electronic health record which can help doctors, health professionals and his/herself analyze the current health status and estimate the probability of conducting some diseases in the next few years.

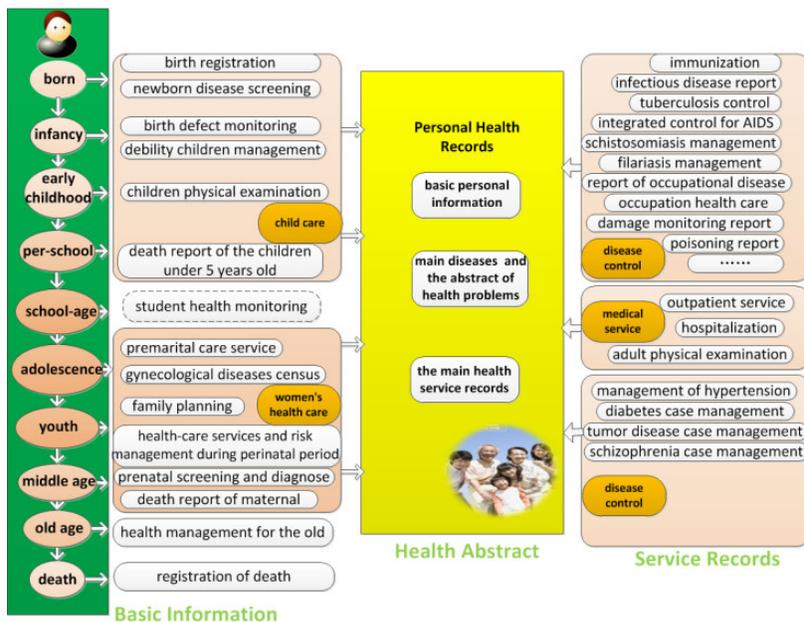


Fig. 4. The basic framework for personal electronic health record

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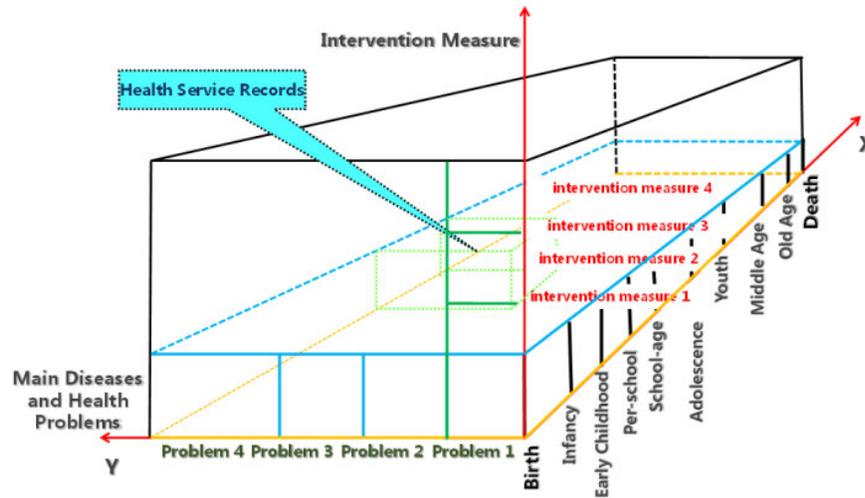


Fig. 5. The architecture of the personal electronic health record

**B. Health Information Collection System.**

This system is designed specially to collect person’s health information, such as blood pressure, blood sugar, electrocardio, blood oxygen and body fat testing device using a variety of Wireless-enabled sensors (Figure 6).



Fig. 6. Some sensors used for health information collection

**C. Health Risk Assessment System.**

This is the most important part of the health management. This system can be used to analyze the data of a person’s own electronic health record system, specify the personal health risk factors and predict the probability of developing some chronic diseases in the next few years using some disease-specific mathematical models. In addition to the conventional Health Risk Assessment methods [19], these models take a number of health risk factors stored in the personal health record into account. They are tested by using more than 20,000 real-life case studies which have been shown more than 90% accuracy, and have passed the examination of Chinese Health Management Association. This health assessment system can find the high-risk individuals who will be possibly developing some chronic diseases in the near future, however have not appeared any clinical signs. If the person is willing to change behavior in order to improve health, then it can avoid or delay the occurrence of chronic diseases by taking some interventions described in the next section. This prediction model for health risk assessment includes following chronic diseases: coronary disease, diabetes mellitus, stroke, chronic obstructive pulmonary disease, prostate cancer, hypertension and obesity, etc.

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**D. Health Intervention and Promotion System.**

This system is divided into two parts, one is nutrition catering system, and the other is exercise prescription system. Nutrition Catering System is designed to improve personal health by providing nutritious diets. In this system, there are nearly all ingredients, kinds of recipes, detailed composition table of foods, and different meals for different physiological states and different diseases. Five functions have been built in this system shown in Figure 7.



Fig. 7. Five functions in nutrition catering system

Exercise Prescription System is designed to improve personal health by formulating personalized exercise programs according to his/her own age, sex and health status. The exercise program includes exercise type, exercise event, amount of exercise, exercise time, notes and so on. Besides, it can evaluate people’s exercise effect in one period so that people can make some adjustments based on the results shown in Figure 8.



Fig. 8. Exercise prescription system

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### E. Health Education System.

Terminal devices, such as TV, mobiles, ipad and computers, can be linked to the health management system via Cable TV, mobile Internet and Internet which can offer comprehensive health education video records, health knowledge and health guidance shown in Figure 9. By using this system, people can gain more professional and accurate health knowledge suitable for them.

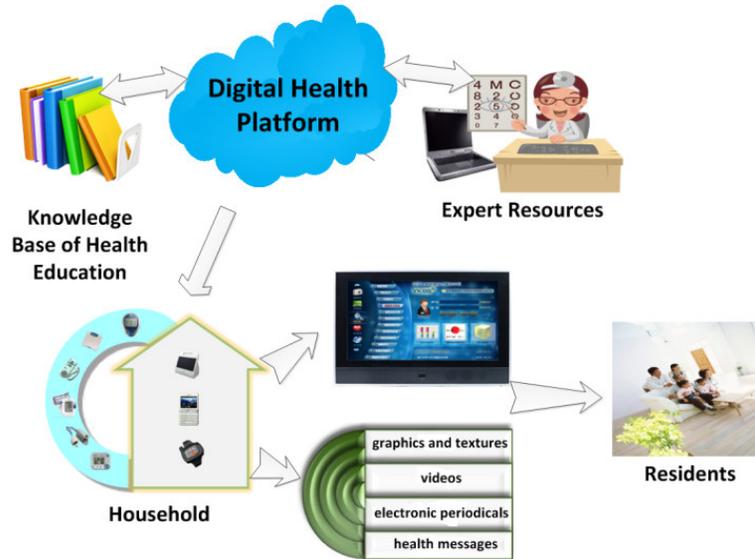


Fig. 9. The highlight of health education system

### F. Telemedicine System.

The telemedicine system described in Figure 10 has following features.

- remote consultation of doctors based on the Internet
- online clinical interactive consultation
- distance learning for special health management courses
- online data transmission supporting document scanning, transfer CT image, PPT and Word document, etc.
- teleconference for doctors and patients, both parties can be on the same page based on the patient's personal health record



Fig. 10. The real-life scenario of telemedicine

#### 4.2.2. Mobility version

The mobile health management system can be treated as a simplified personal health management running on the intelligent mobile phone using Android specifically designed for managing chronic diseases like diabetes mellitus and cardiovascular disease, etc. Some functional modules have been built into these mobile phones including risk assessment module, health care and health management

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module and daily life management module. The healthy mobile phone can not only achieve health data acquisition from a variety of wireless-enabled sensors and forward them to the cloud computing platform for storage, but also can monitor people's health information in real time and can make warnings even automatically when an anomaly occurs. In addition, a number of functions have been integrated into the system such as personal health status monitoring, communication, GPS positioning, emergency call and entertainment together. Seven health apps are installed in the mobile phone shown in Figure 11.

Health toolbox includes six functions, can realize health self-test, hospital and doctor inquiry, nutritious diet and high risk assessment to some diseases.

Early warning is applied to remind people when to take medicine, take the blood pressure measure, have an exercise and have a break, etc.

On-click call helps people click only one pre-defined button on the screen to send "SOS" message to the five pre-scheduled contacts and share his/her current geographic location in emergency condition.

Health monitoring will help people know the current status of his/her own health status, the data are stored in the mobile phone and are periodically downloaded and updated from the health management cloud computing platform.

Health adviser will offer professional and accurate health management related consultancy using the knowledge of nutriology, kinematics, medical science, psychology, and so on.

Location-tracking can show his/her geographic location by using WIFI or GPS. Moreover, the family members or nurse can set an electronic fence for vulnerable people such as patients, disables and the old, as long as he/she is going out of the range, they will be alerted and the location of vulnerable people will be shown in their mobile phone.

One-click registration provides a faster, easier and more convenient way to fill in one's own information for system registration.



Fig. 11. Seven health management mobile apps

#### 4.3. Service layer

A comprehensive service layer has been established in the health management system, which will be packaged as a service product in the future. Starting from collecting basic health data and establishing the person health record, the system will then be used for health risk assessment and a health risk report will be produced. Based on this, the system will formulate a health management scheme according to the people's health status including daily/weekly/monthly meal and exercise plan. And both the person and health professionals can use this system guide the behavior change in order to reduce the probability of developing some kind of chronic diseases. Telemedicine service facilitates the consultation of doctors to overcome the distance limit and save a lot of time and expense for travelling. As in Figure 12, health managers/ professionals and doctors play a very important role by providing the comprehensive health management service aiming to monitor people's health status, response to people's health inquiry and to provide health guidance for high-risk behavior change. In the process, the system can make some appropriate adjustments according to his/her doings. Naturally, it can be used for self health management as well.



Fig. 12. The procedure for health management service layer

## V. Conclusions

In this paper, we design and implement a comprehensive health management system integrating WBAN technology, cloud computing technology, the technology of the Internet of things and other advanced information technology together. As far as we know, this is a first innovative system integrating a number of functionalities including personal health information collection, record, storage and transmission, health status real-time monitoring, personal health assessment, health education, telemedicine and remote health management. In this way, this system can provide health management services on-demand, timely, appropriately and without geographical boundaries, which can benefit to the health care industry and individuals.

As future works, we intend to focus on the development of securing health information database and building a single-sign-on access control mechanism using finger-print technology to avoid data breaches, tampering and loss. At that time, the system could be deployed in the practical scenario for performance testing.

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## Customizing mobile advertising: A marriage of Internet technology and marketing practice

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**Abstract:** *The multiplier effect phenomenon is a characteristic of Internet technology: internationally the Internet is the tap root of many significant developments in economic and social life. This paper was conceived during my study of one of these developments, electronic commerce (e-Commerce). E-commerce has generated a vast body of knowledge incorporating thoughts from many disciplines. This paper follows mobile marketing one of the trails in the corporate marketing dimension of e-commerce. Based exclusively on relevant professional literature, it speaks to the adaptation of certain marketing traditions to mobile devices: cell phones, personal digital assistants (PDAs), smartphones. Thus, this paper projects the marriage of technological innovation and commercial traditions: mobile devices are the technological innovation; careful composition of messages and couponing are among the commercial traditions.*

### Introduction

Electronic commerce (e-Commerce) is an offshoot of Internet technology. The rise of e-Commerce has inspired marketing innovations to improve the interaction between companies and their publics. This paper explores one of these innovations advertising on mobile telephones (mobile advertising) with emphasis on customised marketing.

Mobile telephones are among the applications in the category of wireless communication technologies. The use of these technologies has been expanding correspondingly with the growth of e-Commerce, which has been in high gear since the last decade of the 20<sup>th</sup> century. Wireless communication technologies have given rise to new advertising opportunities, changing the marketing of products and services to prospective buyers. This does not mean, however, that wireless communication technologies are causing a shift from traditional principles of marketing. On the contrary, those principles are being adapted to wireless communication technologies as they are to other integral aspects of e-Commerce. Yoon, Choi, and Sohn (2008, p. 604) observe that the approach of e-Commerce marketers reflects the traditional customer focus of marketing: like their predecessors in prior ages, e-Commerce marketers, in their practice of relationship marketing, aim at “building and enhancing relationships with customers.” Therefore, they buy technologies and techniques primarily to satisfy existing clients and target publics.

Incorporation of marketing traditions in e-commerce resonates with the thought of Montgomery (2001) quoted below, which is an argument that Internet technology, however marvellous and new it may be, is no excuse for the replacement of proven approaches and ideologies in business practice, or for expenditure on vanity change. Montgomery speaks:

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The novelty of the Internet has led many to believe that new techniques and methods must be developed to take advantage of this technology. **This is not the case.** [My emphasis]. Many methods used in promotion, pricing, forecasting, and control in marketing research for the past 30 years have been or could be applied to the Internet (p. 90).

According to *The Economist* (2007, p.n/a) “marketing wizards” agree that mobile advertising is set to overtake other forms of advertising: radio, television, print, billboards and even the Internet. *The Economist* (2007) says marketers believe mobile advertising is more relevant than all the other commonly used methods of advertising. *The Economist* (2007, p.n/a) speaks: “if marketers use mobile firms’ profiles of their customers cleverly enough, they can tailor their advertisements to match each subscriber’s habits.” In other words, mobile advertising offers much opportunity to customise advertising.

Customized advertising can be an effective influence in the construction of preference by individuals, and the authors of customized advertising have many models in the standard tool box for their work as Simonson (2005) explains:

Customized offers may take different forms. The marketer might offer the customer just one option that best fits that customer’s preferences. Alternatively, the marketer might provide the customer with several suitable options, rank ordering them in terms of fit or value or just presenting them as a set of options that fit the customer’s preferences or profile (p.37).

The phrase “number of options” speaks to a dynamic that may affect corporate designers of customised promotions for delivery via mobile advertising channels.

### Mobile advertising channels

Numerous devices deliver mobile advertising: cell phones, iPods, PDA phones and instant messaging (IM) are second nature possessions of millions of people across the socio-economic stratum in most countries. Taylor and Lee (2008, p.711) assert that “for many consumers worldwide, cell phones, iPods, PDAs and instant messaging have become indispensable” and they add to this list of instruments Bluetooth, short message service (SMS) text messages, multimedia message service (MMS), WiFi, and hotspots, which they hail as exciting new prospects for delivery of marketing messages to more publics and more diverse individuals. Tsang, Ho and Liang (2004) observe that the phenomenal popularity of mobile phones and short messaging service (SMS) has encouraged advertisement for products and services on hand held devices. They cite a survey which found that in one year alone over 100 billion SMS messages circulated internationally.

“Tailored to consumer needs” and “processed with sufficient involvement to communicate its message” are descriptions which resonate with customization of mobile marketing.

### Research

The research which grounds my literature based research is that mobile advertising has become an established branch of e-commerce, and investment in customized mobile marketing is a fair proposition for mobile operators.

### Literature Review

Mobile phones are highly personalized devices. They derive this quality from access to the Internet through wireless application protocol (WAP) the outcome of the wireless application protocol, an innovative creation by Ericsson, Motorola, Nokia, and Phone.com. According to Rysavy (2000) these companies created the WAP forum to meet two main objectives: 1) to improve menu-driven applications for small Web browsers which run on systems with limited resources, mobile phones pre-eminently, and 2) to offer operators a mechanism to control the means by which users access content and applications.

The critique of Jakob Nielsen, a Web technology consultant (cited in McWilliams, 2000, p.n/a), outlines the particularity of WAP: “WAP was designed to fit the limitations of cell phones-with small displays, no storage capacity and only limited communication speed or “bandwidth.”

According to Ozen, Kilic, Altinel and Dogac (2004) facilitating personalized information is a major concern of mobile network operators and software companies. As an example of production to this end, they note Nokia’s Artus Messaging platform.

Doculabs (cited in Meister, Shin, and Andrews, 2000, p.8) defines personalization in the digital world as “the design, management and delivery of content and business processes to users, based on known, observed, and predictive information.” That is to say, personal data issued by users are the raw material for personalized information which operators produce and transmit digitally to users.

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The effectiveness of digital world personalization depends on personalization technologies. Colkin (2001) describes four standard personalization tools to be found in portals:

- 1) Customization tools [which] let users create their own desktop work space;
- 2) Topic areas: users build profiles in subportals used to retrieve and deliver relevant information from the Web;
- 3) Rules-based personalization: Businesses create rules to provide tiered access to information; for example, a platinum user has more access to privilege than a silver user;
- 4) Observation engine personalization: clickstream data is used to recommend where to find information or help, based on traffic patterns of other users with similar profiles or surfing patterns (p. 49).

Shen and Ball's (2009) study identified three types of technology mediated personalization (TMP):

- 1) *Interaction personalization* refers to individualised courtesy and recognition behaviour in firm-customer specifications;
- 2) *Transaction outcome personalization* refers to customization of products or service offerings based on customer specifications;
- 3) *Continuity personalization* refers to ongoing customization based on adaptive learning and knowledge of customer preferences and/or goals (p.82).

Whatever the technology used, personalization is an approach to consumers. Therefore, it is one of the many variables which affect the behaviour of consumers.

In the discourse of some observers, consumer behaviour can be explained in terms of hedonism and utilitarianism. In the argument of Barnes (2007), there are two sets of consumers: consumers who are motivated by hedonic gratification, and consumers who are motivated by utilitarian instrumentality. Typically, consumers who act on principles of hedonic gratification assess products and services on their pleasure potential whilst consumers who act on principles of utilitarian instrumentality typically evaluate products and services on their usefulness including durability and longevity. In a work covering consumption and customer satisfaction, Holbrook (1994) notes that mobile advertisements activate the hedonic pleasure principle in offering consumers customised products which cater to egotistical taste. Bauer, Greyser, Kanter, and Weilbacher (1968) concluded from their studies that hedonic dynamics are a variable in the responses to advertisements by some consumers; in this respect, they observe that these consumers prefer advertisements which are more enjoyable than cut and dried informative ones. In the research based discussion of Merle, Chandon, and Roux (2008) the value of customization ties in with a special hedonic value, unique possession: consumers desire a product they consider unique. According to Fiore et al. (cited in Merle, Chandon, and Roux, 2008) this desire for a unique product is a key underpinning of customization programs.

Retail businesses try to exploit both hedonic and utilitarian dynamics in the behaviour of consumers by offerings which cater to pleasure concerns and practical objectives. I view couponing as an example of this practice.

Scholarly information on couponing is in short supply: Narasimhan (1984, p. 129) observes that "past research in marketing on coupons and their effect on consumers is rather scanty." Little appears to have changed on this point in the twenty two years since this observation. Nonetheless, it is well known that coupons are a price reduction agent: holders of coupons are entitled to a discount on the price of particular products. Reduced prices have values of pleasure and practicality: most people are pleased when they spend less than might have been the case; by spending less, they have a practical gain in the form of savings. Antil (1985) traces the birth of couponing to 1895, when, in the USA, the cereal manufacturer, C. W. Post offered a cents-off paper coupon for purchase of a new cereal product, 'Grape Nuts.' Couponing has endured. Traditionally coupons are in paper form exclusively. In the age of e-Commerce, they have become part electronic and part paper. Smith (1999, p. 42) describes the ecoupon phenomenon by reference to a California based company developed by e-Commerce experts: this company offers a site where consumers can explore discounts: "Customers in the market for deep discounts can search 24 hours a day, seven days a week, by category...geography, company name and more." Speaking about the USA specifically, Liddle (2000, p. 34) noted that "Among brick-and-mortar retailers, fast-food and other restaurants enjoy high rates of redemption for coupons obtained off the Internet."

Through e-couponing, mobile advertising potentially helps to break down the scepticism of utilitarian individuals to ownership of smartphones and other mobile communication devices. Barnes (2007) argues that consumers who are interested exclusively in utilitarian products may not be easily won over by mobile advertising. Price reducing e-coupons might persuade these consumers to give mobile devices and mobile promotions a chance in their life. In the observation of Shankar, Venkatesh, Hofacker and Naik (2010, p.115), e-coupons are becoming entrenched in the marketplace and retailers have a stake in their promotion: "Mobile coupons are gaining rapid consumer acceptance and are providing retailers with high returns on investment."

Dhar and Wertenbroch (2000) argue that the hedonic versus utilitarian considerations dynamic is a fair factor in pricing: the following extract illustrates their argument, which may collide with the idea of equitable pricing:

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Marketers ought to be able to charge premiums for hedonic goods to which consumers have adapted in some manner when the consumers are faced with a decision to discontinue consumption. For example, all else being equal, marketers may be able to add a hedonic premium to the buyout option price at which lessees of luxury or sports cars can buy their vehicles at the end of the lease term (p.69)

In Narasimhan's theory of coupons (cited in Fortin, 2000, p. 517) couponing is a strategic deployment by companies based on the division of consumers into price sensitive and non price sensitive groups. Through couponing, a company seeks to "maximise its gains" by increasing customers for products through the lure of coupons which price sensitive consumers use to reduce the retail price for themselves. That is to say, through use of coupons, price sensitive consumers personalize retail prices. Or so it might seem to their satisfaction.

### Research Significance

My proposed research follows the view that the rising popularity of hand-held devices with third generation (3G) telecommunication technology and text-messaging capabilities offers new and advantageous opportunities for marketers. Its objective is to establish a strategic program for enhancement of product visibility through hyperlinks in SMS which enable customers to download e-coupons for redemption during physical shopping. This proposition requires examination of certain issues, which I divide into "Positive Elements" and "Inhibitors" in the next two sections respectively.

### Research Significance: Positive Elements

#### SMS based advertisements

In his song of praise for SMS, Dad (2012, p. 249) identifies four key advantages: 1) "High speed text message delivery," 2) "Interactivity," 3) "More customer reach (Mass communication," and 4) "Response rate for SMS is five times more than [for] direct postal mail." Less enthusiastic, Okazaki and Taylor (2008) argue that the 160 characters limit in SMS restricts promotional presentations such that advertisements via SMS might be inferior to banner advertisements in terms of impact on consumers. In the results from their multi methods study of mobile phone consumers, Bamba and Barnes (2007) list three significant objections to SMS advertisements: 1) unsolicited, they are a violation of privacy; 2) consumers feel harassed by irrelevant text messages from mobile operators; 3) SMS ads interfere with consumer' everyday activities and important correspondence. In the light of Bamba and Barnes' (2007) discussion, e-Commerce marketers should learn and understand concerns consumers have about receiving advertisements on their mobile phones.

#### Site customization

Ansari and Mela (2003, p.132) argue that companies modify websites for two main reasons: 1) "to appeal to users or enable the users themselves to self-customize the content." They observed this phenomenon in portal sites such as Altavista and Netscape, where "Users of such sites can specify keywords of interest to filter news stories, can provide lists of stocks for which they require regular information, or can manipulate the page views themselves." In Ansari and Mela's (2003) argument, the key advantage of user-initiated customization is actualisation of user preferences and user management of their desires; its notable disadvantages are that its mechanics may be challenging for new users, and some users may not be able to analyse and express their preferences as they would like. Therefore, in the experiment within this study, on-site customization will be embedded in SMS messages. Thus, when the user clicks the hyper link, the product website will surface for the user's customization.

#### External customization

In the discourse of Ansari and Mela (2003), external customization describes an approach to cultivate website users, in which operators use communication media to disseminate content that is potentially interesting for website users. The common communication media channels include e-mails, banner promotions, and affiliate sites. Ansari and Mela (2003) emphasise the use of e-mail: "our particular application involves personalizing permission-based e-mail design and content to attract the e-mail recipients to a Web site." A major limitation of external customization via e-mails is that such e-mail messages are at risk for automatic spam mail classification and related disposal which means addressees do not see these messages. Spam mail is a well known nuisance in e-Commerce. SMS communication is not immune to it although consumers can buy protective software to counter its effects (*Marketing Week*, 2002; By, 2001; Bajay and Hitesh, 2011).

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The problem of spam mail is part of the larger issue of privacy in e-Commerce and other Internet based activities. Awad and Krishnan (2005) argue that companies with an interest in external customization for marketing should consider seriously the tension between personalization and privacy.

In other words, in the logic of Awad and Krishnan (2005), marketers might waste resources and time targeting consumers who are more concerned about unauthorised disclosure of personal data than about receiving data on products and services in the market through customized text messages.

McCartney (2003) reinforces concern about the impact of privacy concerns on mobile advertising in comments on “clouds on the horizon” for marketers who use SMS communication: according to McCartney (2003, p.n/a), increasingly, consumers are not happy with “screen clutter and invasion of privacy.” Based on the results of many studies, Carroll et al. (cited in Phau and Teah, 2009, p. 105) conclude that “the privacy issue [is] one of the biggest issues in SMS advertising; [therefore] marketers would have to implement sound relationship programs to gain customer trust in the brand before consumers are likely to respond.” That is to say, traditional promotion of the brand may be a vital precondition for the effectiveness of SMS advertisements.

### Customized text messages

Over a decade ago, Maddox (1996) spotted the emergence of customised communications in the e-Commerce environment:

As more and more companies compete in cyberspace, it has become evident that flashy text, graphics and other multimedia messages no longer will be enough to attract Web business from savvy Internet customers. Many companies, from reader’s Digest Association Inc. to radio networks, are turning to sophisticated software that lets them tailor their Web content to specific users (p.n/a).

The process, in which this “sophisticated software” is a key agent is one, in which, speaking in linear progression terms, companies gather information on existing and prospective customers, develop customer profiles from this information, and design communications, including text messages to fit these customer profiles. These text messages could present special, limited time offers and links to associated websites. To open messages with links to specific websites, users would need to have mobile devices incorporating 3G standard technologies.

According to Wood (2005), the mobile phone industry was euphoric about 3G: in the general view of the mobile industry:

3G services have brought the promise that brand marketing can reach mobile users in style....3G hopes to give brands access to elusive consumers through interactive propositions built with high quality video and audio, with more accurately targeted messages (p.n/a).

The popularity of text messaging was critical to the realisation of the expectation of the mobile industry. In their research, Ansari and Phillips (2011) found that text messages have hedonic value for some consumers who are represented by a respondent who said:

This is the joy of the text message. Unlike a phone call, it allows you to look sociable and sought after when all by yourself in public places, even if it is only your mum asking you what you want for dinner that evening (p.20).

I would argue that this egotistic reaction to text messaging is the kind of consumer behaviour that is beyond the calculation of marketers. In the discourse of Ansari and Phillips (2011), consumer behaviour can determine the fate of products:

As consumers forge cultural worlds through the pursuit of shared consumption interests, the product or set of practices may become accepted and legitimate among large swathes of consumers without explicit endeavours from any organised actors (p.35).

As with conventional culture, the cultural world of consumer behaviour has elements of innovation and tradition. So, it is no surprise that the culture of couponing exists in the cultural world of text messages in the form of e-coupons. Carter (cited in Dad, 2012, p. 249) notes that “mobile coupons for price discount can be sent through SMS for generating sales promotion.”

And Yang and Hye-Young (2012) argue that utilitarian consumers satisfy their taste for efficiency shopping when they scan mobile coupons at in-stores to save money.

## Summary

It must be acknowledged that, as with all matters economic, positive elements are offset by limitations. In the next section, I will discuss potential inhibitors which, in the logic of the caveat emptor principle, mobile marketers should consider as they face glowing rhetoric around SMS and other aspects of the mobile phone industry. These limitations represent grounds for room for improvement in mobile marketing.

## Research Significance: Inhibitors

### Anonymity & Privacy

Issues of anonymity and privacy are unavoidable for companies which propose customized marketing for strategic promotion of sales. According to a survey reported in *Business Week* (cited in Gritzalis, 2004, p. 257) “privacy and anonymity are the fundamental issues of concern for most Internet users.” A “Los Angeles Times” article, referring to data for the USA, the world’s major consumerist society, (as cited in Fienberg, 2006, p. 144) illuminates popular concern for anonymity and privacy in the age of digitalised transactions.

Against this observation, it is understandable that many people worry about the privacy implications of e-Commerce and are willing to install protective devices against electronic intrusions which threaten their privacy. Scharl, Dickinger and Murphy (cited in Dickinger and Kleijnen, 2008, p. 34) noted this behaviour among mobile phone users:

Consumers are extremely sensitive to such services [anti spam devices] because the mobile space is considered highly personal and consumers are willing to go to great lengths to protect their mobile space.

The starting point for customized marketing is knowledge which signals consumer preferences: “After uncovering customer’s preferences, marketers can offer them what want, often even before customers know they want it” (Simonson, 2005, p.32). Of course, the information constituting “customer’s preferences” has to be reliable if it is to be effective. However, if consumers are anonymous to companies, marketers may not be able to capture reliable information about preferences of individual members of consumer publics; additionally, they will be restrained in disseminating unsolicited promotional messages. Dickinger and Kleijnen (2008) suggest that marketers might overcome the fog of consumer anonymity by collecting shopping basket data from retail stores’ electronic point-of-sale check-out systems. Dickinger and Kleijnen (2008) hold that this information provides material for the construction of target segments in the consumer public, but they acknowledge that achieving coherency from shopping basket data is a complex, challenging assignment due to the variety of retail purchases by individual shoppers. I would add to this critique that sorting out shopping basket data in order to create target segments in the consumer public might also be expensive for firms, putting upward pressure on retail prices as they recover costs from customers.

### Spamming

The well known and much covered problem of spamming is a logical sequel to the previous discussion of anonymity and privacy. Most mobile users like most Internet users dislike the experience of spamming in which they receive unsolicited messages of one kind or another, some of it offensive or unpleasant. Wary of spamming, many users, as mentioned in the prior section, install barriers to unwanted bulk electronic mail. In order to ensure that their promotional messages are not stopped by these barriers and thus, fail to reach their addressee, marketers should arrange customers’ permission. Waring and Martinez (2002) recommend the use of permission based e-mail. In terms copied from Meta Group, they define permission based e-mail as “A promotional e-mail whose recipient consents to receive commercial messages from the sender, typically by signing up at the company’s website” (p.58).

In their discussion of mobile advertising strategies, push and pull, Wilken and Sinclair (2009) cite the opinion of Barnes and Sconavacca, and Kavassalis et al. that consumer consent is a vital consideration for mobile marketers; they observe that “mobile advertising is sometimes referred to in the professional literature as ‘permission based’ marketing” (p. 431). Wilken and Sinclair (2009) also note that consumer consent for despatch of promotions via electronic communication is legally binding: for example, in the European Union (EU), this consent falls under an EU directive. For reasons related to the sales generation effect of promotions, Scharl, Dickinger and Murphy (2005) advise mobile marketers to be wary of spamming: “Unsolicited messages, commonly known as spam, stifle user acceptance, particularly as mobile phones cannot distinguish between spam and genuine communication automatically”(p.168). In other words, the experience of spam can taint all promotional messages in the eye of users.

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### Bandwidth

Typically, the efficiency of mobile communication has been constrained by unreliable, low bandwidth, which affects the capacity and speed of data throughput. 3G services and unlimited data plans offer mobile marketers some relief from the bandwidth straitjacket, and mobile bandwidth will undoubtedly improve as the telecommunications industry lays down more fibre. A Rogers Wireless vice president (cited in Levy, 2010, p.n/a) expects bandwidth enhancement from the development of fourth grade (4G) technologies: he says “4G is fundamentally a much faster pipe....And a faster pipe will allow us to do a lot of things that we can't even imagine today.” While they await this future, mobile marketers must continue to recognise the reality of bandwidth limitation and scale messages so that intended recipients receive pertinent information on schedule.

With respect to existing bandwidth imposition on space for messages, mobile marketers could hardly do better than follow the advice in Shankar and Balasubramanian's (2009, p.127) essay on mobile marketing: “A mobile message will be most effective if it is brief, memorable and well-coordinated with time and the user's location.” Supportively, Varnali, Yilmaz, and Toker (2012, p.577) concluded from their field study that “the relevance of the message” is a determinant of “success in mobile advertising;” that careful calculation of user interests before sending messages improves return rates and facilitates a viral impact of mobile advertising through forwarding of advertisements through text messages and emails.

### Media cost

Media cost is per se a brake on implementation of marketing strategies by telecommunication companies. According to Scharl, Dickinger, and Murphy (2005) the cost of maintaining databases for customer profiles and preferences should be the key metric for cost analysis by mobile marketers as they plan customized advertisements. Mobile marketers also have to take into account the overall cost of mobile operators.

Ying-Feng and Ching-Wen (2006) point out that a significant cost for mobile operators is the cost of a 3G licence to incorporate this state-of-the art technology. Internationally, for some operators this “heavy cost” has also been a bitter pill, because the consumer take-up of 3G related services has not happened to the extent that was expected in the strategic planning phase. marketi

### Summary

None of the limitations I have discussed is likely to be fatal to the sustainability of mobile marketing because the outlook is decidedly optimistic for the mobile phone industry. Take the upbeat comments of Kaplan (2012, p.1371): “Mobile devices will likely penetrate the world with increasing pace, becoming the only means of communication that allows the global reach of customers in different countries and demographic groups.”

### Research Methodology

The research for information to underpin my thesis was entirely literature based to review professional opinion of the history and prospects for the mobile phone industry and mobile marketing. Historical literature helps one to trace the development of the mobile phone industry within the larger context of e-Commerce. Futuristic literature reveals various thoughts on the growth of mobile marketing, a subset of the discipline of marketing. Having accepted the idea that mobile phone possession is individualistic, hedonic behaviour, I paid much attention to customization of mobile marketing.

My literature consultation was with online journals published on databases which the academy has incorporated in its library system. My work reinforces the view of Varnali and Toker (2010): “Mobile marketing articles are scattered across various journals in many disciplines such as management, marketing, business, engineering, information technology, information systems, finance, and operations research” (p. 145). The main databases which I visited were ABI/INFORM Global and ScienceDirect. In the case of the latter, articles derived from Elsevier proved interesting and instructive.

### Conclusion

After their study of mobile marketing, Varnali and Toker (2010) asserted that “the stream of research [on mobile marketing] is still in the development stage hence [it] is highly inconsistent and fragmented” (p.144). Notwithstanding this cautionary observation, the literature accumulating from this “stream of research” bears witness to the intensifying importance of mobile devices—cell phones,

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PDA's, smartphones—in a digitalised world. And students of mobile marketing have no better resource for their study than this literature. Thus, this paper has been constructed on the most reliable basis available for its thesis on mobile marketing.

The argument I have developed in this paper is tripartite: first, use of mobile devices for communication is settled practice internationally, 2) the ubiquity of mobile devices has generated the mobile marketing subset of corporate marketing, 3) investment in mobile marketing appears justified given both the existing popularity of mobile devices and the optimistic outlook for their sustainability in consumer behaviour.

At the end of this work, a few questions arise as attachments to the thesis that mobile marketing is a viable proposition in e-Commerce:

- Mobile marketing might overtake conventional email as a promotional medium.
- Mobile marketing might chime particularly well with hedonic consumers.

These questions add value to this paper, making it a starting point for further study of mobile marketing.

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## Designing a Computer-assisted Language Learning(CALL) Program and Measuring its Effect on Saudi EFL Learner's Achievement in English.

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**Abstract:** *This study aims at investigating the effect of computer- assisted language learning program on EFL Saudi students learning of English. The computerized program used was prepared by the researcher. The sample of the study consisted of 41 students randomly selected from Al-Riyadh Teachers' College and assigned to experimental and control groups. An achievement test was used to collect data from the students who participated in this research. The findings of the study indicated that using computer-assisted English language learning (CALL) has a positive effect on the experimental group students' achievement.*

**Keywords:** CALL, CAI, Saudi EFL University Students, English language Instruction

### Introduction

Computer-assisted language learning (CALL) is an approach to teaching and learning foreign language where the computer and computer-based resources such as the Internet are used to present, reinforce and assess material to be learned. It usually includes a substantial interactive element. It also includes the search for and the investigation of applications in language teaching and learning. Except for self-study software, CALL is meant to supplement face-to-face language instruction, not replace it. In recent years, CALL researchers have investigated the advantages of using computers as teaching/learning tools in improving different language skills. Many studies indicate that CALL provides an innovative and effective alternative for language instructors (Warshauer and Healey, 1998). In addition, many studies indicate that there has been an increase in emphasis on computer technology and its integration at all level of education (Stepp-Greany, 2002). Furthermore, computer would allow learners to progress at their own pace and work individually to solve problems, provides immediate feedback, allows learners to know whether their answers are correct or not, and provides them with the correct answers if their answers are not correct.

Moreover, there are many more advantages of CALL. It motivates shy students to feel free in their own students-centered environment. This will raise their self-esteem and their knowledge will be improved. The computer can provide an individualized context and an interaction learning environment. The learner can use colors, graphics, painting, and TV screens (Al Abdel Halim, 2009). CALL is designed for retrieval and extraction of meaningful data analysis. Thus, computer programs may facilitate the process of content analysis, main theme perception, keyword recognition, syntactic categories, and the covert the printed language into communicative one (Wright, 2003). The use of technology inside and outside of the classroom tends to make the class more interesting. CALL can promote students' motivation (Jonita, 2002). Computer has the role of providing attractive context for the use

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of language rather than directly providing the language the students needs (Noemi, 2007).

In addition, it has been reported that CALL has/have a positive effect on the learners' attitudes towards using computers for learning EFL skills. Greenfield (2003) reported that the majority of Hong Kong 10<sup>th</sup> and 11<sup>th</sup> grade students said that computer-based learning is enjoyable because they confidence in learning language via computer. They feel that computer helps them improve their writing and speaking skills through developing their way of thinking and motivating them for more interaction and cooperation. Aacken (1999) stated that there is a positive interaction between students' positive attitudes towards CALL and instrumental motivation which lead to mastering language effectively. Warschauer (1996) also pointed out that CALL enhances students' motivation to learn language skills such as writing and improve communication and interaction. Moreover, Gousseva (1998) thinks that students' attitudes to electronic interaction in writing classes are generally positive because it allows them to see different viewpoints, and gives them a chance to read and learn more. In order to evaluate the success of CALL, Gillespie and McKee (1999) called for the investigation of the students' attitudes towards the effectiveness of the use of CALL approach, techniques, methods, and programs. Bernt et al. (1990) concluded that attractive benefits of computer applications play a dominant role in affecting one's attitudes towards using computers.

As educational decision-makers face the challenges of maintaining and expanding the instructional computing movement, they need current information about the past and potential impact of computer implications to help them invest their resources wisely. Moreover, the researchers think that technology may help teachers and learners to establish their own methodology for teaching and learning. They also think that teachers and learners should be motivated to use technology in the classroom. Teachers should have the courage, confidence and positive attitudes to utilize technology in their teaching. This, in turns, will enhance the learners' achievement and attitudes toward learning English. Very few researches on the effect of this move have been conducted in Saudi Arabia. Therefore, this study aims at investigating the effect of using computers in English language learning on the achievement of the university students.

### Statement of the Problem

The researcher noticed that many Saudi EFL university students encounter many difficulties in learning English language. In addition, they lack the motivation to learn English. Consequently, they develop negative attitudes towards English. This has been obvious through the tests and the instructors' evaluation of the performance of the students. It seems that the current methodology employed in my college didn't help the students to overcome the difficulties they face in learning English, even it didn't motivate the students to learn English ; enhance their ability to learn it; or develop positive attitudes towards it. The researcher thinks that the use of technology in general and CALL in particular may help in changing the situation. As a result, the need arises to study the effect of using computers on the students' achievement in English. The researcher intends to investigate the effect of Computer-Assisted EFL Instruction alongside the traditional method on the university students' achievement in English.

### Significance of the Study

The role of CALL in the foreign language classroom has been the concern of many teachers and scholars; however, its validity as an equal complement to language learning has not been fully investigated . Moreover, a great deal has been written about CALL. It is impossible to completely cover such vast topics but researchers may cover as many areas as possible to enable us to come up with a clear understanding of the role of CALL inside the classroom. This study invest ages the effect of CALL on the achievement of EFL learners in English .

Computers have become so widespread in universities, schools and homes, and their use have expanded so dramatically in a way that motivates some language teachers to use CALL in their classes. As the technology brings about changes in the teaching methodologies of foreign language, teachers and learners should meet these changes. The computer itself does not constitute a teaching method, but rather the computer forces teachers and learners to think in new ways to exploit the computers; benefits and work around its limitations. For this purpose language-teaching specialists are needed to promote a complementary relationship between computer technology and appropriate educational programs (Al Abdel Halim, 2009) .

Therefore, it is hoped that this study results in the following advantages:

- 1- It will help researchers involved in the educational process gain insights into CALL and seek to improve it over time.
- 2- It may encourage further research, which in turn, may lead to the enrichment of the field of CALL in general and language teaching and learning in particular.
- 3- It will help teachers to better understand the issue and integrate CALL into their classroom routine.
- 4- The information gathered in this study will aid proponents of CALL in better understanding the educational effects of their craft.

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5- The findings of this study may be able to open the mind of the students towards the importance of using CALL to improve their performance in English.

6. The findings of this study and of other studies may help students to see the difficulties in learning English that they may face if they do not have the habit to use CALL in learning English .

### Objective of the Study

Because CALL should be an important part of the university curriculum, and especially because CALL has not been widely studied in Saudi Arabia, the present study attempts to investigate whether using computers in teaching English to university students is significantly different from teaching English without the aid of computers. The purpose is to compare using Computer-Assisted EFL Instruction with using the traditional method and decide which is more suitable for the students under investigation.

### Question of the Study

The present study attempts to answer the following questions:

- 1- Does CALL Instruction have a positive effect on the Saudi EFL University students' achievement in English Language?

### Variables of the study

The variables of the present study include the following:

- The independent variable is the method of teaching which has two levels, the extensive reading program and the traditional method.
- The dependant variable is the students' performance in writing.

### Limitations of the study

The generalizability of the findings of this study may be limited by the following:

- This study is restricted to two groups of students at the Riyadh Teachers College.
- The findings are bound by the time limit for the period in which the study was conducted.
- Females were not included in the present study.

### Review of Related Literature

The review of the literature on CALL revealed that most of the studies in this field were conducted in the western countries where English is a first or second language, whereas very few studies were conducted in countries where English is a foreign language. The researchers reviewed some of the most related studies to the topic of this study.

Fletcher and Atkinson (1972) carried out one of the earliest studies in which the students of the experimental group received eight to ten minutes of computer assisted language instruction per day for five months; the remainder of the day was the same for all students. The findings of the study revealed that the performance of most students who received computer-assisted instruction was better than the performance of those who did not.

Saracho (1982) compared the performance of two groups of 256 Spanish-speaking 6<sup>th</sup> grade students. The experimental group participated in a CALL instructional program and the control group participated in a regular instructional program for five months. The findings of the study revealed that the students in the experimental group gained higher scores than the students in the control group. The difference in the achievement is due to the use of CALL.

Cook (1985) determined whether there were significant differences between the growth of writing performance of seventh grade students who received computer-assisted writing instruction and those who did not. He found that the students who received computer-assisted writing showed better performance in writing than those who did not.

Copper and Copple (1985) compared the achievement effects produced by all forms of computer-based instruction with the effects of traditional instruction. The results indicated that computer-based instruction approaches produce higher achievement than traditional instruction approaches.

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Stennett (1985) reported that well designed and implemented drill and practice or tutorial computer assisted language learning (CALL), used as a supplement to traditional instruction, produced an educational significant improvement in students' final examination achievement. He assured that call lessons foster a kind of dialogue between the teacher and the computer as a way to strengthen the value of the lesson.

Kolich (1986) investigated the effectiveness of computer programs in teaching a list of unfamiliar words to 171 11<sup>th</sup> grade students. The experimental group were exposed to fifteen low frequency words via a computer program entitled "Word Attack", while the control group were taught by using the traditional method. The findings of the study showed that there were statistically significant differences between the scores of the experimental group and the scores of the control group attributed to using the computer software program.

Kleinmann (1987) studied 76 ESL college students enrolled in a basic college reading course over a semester. The experimental group had been taught via computer while the control group had been taught via the traditional method. He concluded that it is important to create more innovative reading software programs that foster more interaction between students and the computer.

Orndorff (1987) implemented a course at Duquesne University in Pennsylvania, which combined the teaching of reading skills with computer aids that provided different kinds of support. He employed two computer programs focusing on critical reading and thinking. The first one was designed to teach students how to analyze a work of literary genre and structure and to be used with a book. The second one allowed teachers to create tutorials which featured different types of question and answer formats, an on-line dictionary, screen manipulations. These two programs also included different activities such as summary writing and short essay questions. The findings showed that because of such programs, the students' levels of achievement and retention increased.

Arroyo (1992) studied the effect of using computers on reading achievement of seventh grade students. The findings showed a statistically significant increase in reading achievement of the subjects who used computers. Moreover, Arroyo stated that, in addition to the improvement in reading scores, the use of computer appeared to increase the subjects' motivation to learn.

Due to the importance of using computers in teaching foreign languages, Hamilton (1995) conducted a study on 46 6<sup>th</sup> grade students. He divided them into two groups to see the differences between the Computer-Assisted Instruction group and the traditional instruction group. The result was in favor of using the computer but with very limited generalization due to the small sample size.

Avent (1994) investigated the language learning achievement differences between students using computer-assisted language learning courseware and students using the traditional language laboratory. The findings of the study revealed that the mean scores were significantly higher for computer taught items than for non-computer taught ones.

Chen (1996) studied the differences between male and female Taiwanese students using the same software and receiving the same type of feedback in a Business English class. The findings showed that computer application improved the students' writing ability in punctuation, grammar and spelling.

Pigg (1996) investigated the effect of the computer-assisted language instruction program Paragraph Builder on fifth grade students' topic sentence identification. The results of the posttest showed that the program significantly increased the mean score of the posttest. The results also showed that the students who worked with computer enjoyed learning about topic sentences by using the program.

Cantos-Gomez (1997) carried out a study to investigate the use of computer-assisted language learning activities in English and their effect on the students' motivations to learn. She found that the students in the experimental group, who used computer, showed more motivations to learn English than those in the controlled group.

Machado (1997) investigated the effect of computer-based technology on the language acquisition rates of sixth, seventh and eighth grade second language students in writing and speaking. The study revealed that the experimental group showed a faster rate of second language acquisition than that of the control group students. He recommended that language teachers receive training in computer-assisted teaching and learning methodologies for second language acquisition.

Blankenship (1998) compared between computer-assisted instruction and the lecture-based instruction of college-level composition courses. The findings of the study showed that the performance of the students who received computer-assisted instruction was better than those who did not.

Campion (1999) investigated the effect of CALL on learning and transfer of vocabulary in primary stage pupils. The researcher tackled two issues: motivation and the role of educational technology in learning and transferring of passive vocabulary into the active. The findings of the study showed that the pupils who learned via CALL improved their results in both types namely in active vocabulary.

Cathy (1999) studied the extent to which computers can provide supplementary practice for 16 beginning readers, aged 6 to 7 years, and the effectiveness of specific design features. Two versions of the software were compared. One software version incorporated commonly available features only and the other was full implementation of the innovative design. It was found that electronic books

can complement teaching approaches in infant classrooms and can positively affect both cognitive and affective learning outcomes. It is evident that lower ability readers can benefit from common features alone, such as word pronunciations. Those children using enhanced software who had already acquired a limited sight vocabulary made significantly greater gains in key word recognition than the children using the basic software version.

Cunningham (2000) investigated the opinions of students towards using computers in a writing course. He indicated that students found the computer-based class more challenging but non-threatening. Students also think that computer is helpful because it enables them to pay attention to the mechanics of their writing. In addition, it was found that students' positive attitudes towards writing on computer contribute to improving their writing abilities by increasing their motivation to write and revise, and sharing their ideas with classmates.

Students' positive attitudes towards CALL motivate them and thus achieve more. Smith (2000) studied the phenomenon of students' positive or negative response to using CALL as a language learning approach. He concluded that there is a relationship between students' attitudes towards type of teaching/learning and their attitudes towards certain CALL activities. This means that students' positive attitudes towards CALL help them benefit more from technology in learning language skills.

Singhal (2001) investigated the effect of CALL on ESL. He used three reading passages of appropriate difficulty level and varied topics. Text 1 was the kind of text that we may find in academic journals related to language learning. Text 2 was a short story. Text 3 was an argumentative essay. Each of the three reading passages included questions testing various skills. The study revealed that computer played an important role in improving the students' reading comprehension achievement.

Brown (2002) thinks that learners should acquaint themselves with the new products of the global technology, like, the internet and computer programs. He thinks that learners become active participants when they are involved in the learning process and are encouraged to be explorers and creators rather than passive recipients. Therefore, this study was designed to measure the effectiveness of a computerized language-learning program on the achievement of the EFL university students in English.

Al-Makhzoumi and Abu Al Sha'r (2003) compared the effects of using computer multimedia approach and context based approach on EFL major university students' learning of English. The findings of the study revealed that students in the experimental group, who received instruction via computer multimedia, significantly outperformed students in the control group, who received instruction via context-based materials. The authors stressed the need for more emphasis on the use of computer assisted multimedia to promote the instruction and learning of English among English major students and teachers.

Lasagabaster and Sierra (2003) investigated the opinions of 59 university students about the effectiveness of CALL programs. They concluded that the students consider CALL programs as complementary tools in language learning and that CALL creates a less stressful environment for students as they can study on their own in a more flexible schedule.

AbuSeileek (2004) investigated the effect of a computer-based program on Jordanian first secondary grade students' writing ability in English. The study revealed that there were statistically significant differences between the mean scores on the writing task of the experimental group who received instruction via computer and the control group who received instruction via the traditional method in favor of the experimental group.

Al Bakrawi (2005) investigated the effect of a computerized ESP program on the proficiency of secondary stage hotel- stream students in English. The findings of the study indicated that the computerized ESP program has a measurable effect on the participants' proficiency in English. The researcher concluded that the high level of the proposed program apparently lead to an effective process of teaching and learning resulting in significant improvement.

Al Qomul (2005) investigated the effect of using an instructional software program on basic stage students' achievement in English language grammar. It was found that there were significant differences in the means scores of the students in the experiment group who were taught using CAI and those in the control group who were taught using the traditional method. The findings of the study confirmed the positive effects of CAI in teaching English.

AbuSeileek (2007) investigated the effectiveness of two-mediated techniques – cooperative and collective learning – designed for teaching and learning oral skills, listening and speaking. He also investigated students' attitudes towards using a CALL approach and techniques for teaching oral skills. The findings of the study showed that the cooperative computer-mediated technique is a functional method for learning and teaching oral skills. The survey conducted in the study also showed that students react positively to both the CALL approach and the cooperative computer-mediated technique.

Al- Menei (2008) studied the effect of computer-assisted writing on Saudi students' writing skill in English. The findings of the study showed that computer-assisted writing has a significant effect on EFL Saudi students' writing ability in two areas: paragraph writing and correcting grammar.

Al- Mansour and Al-Shorman (2009) investigated the effect of computer-assisted instruction on Saudi students learning of English at King Saud University. The findings of the study indicated that using computer-assisted English language instruction alongside the traditional method has a positive effect on the experimental group students' achievement.

Ferit (2009) conducted a study to find out the effect of an undergraduate-level computer-assisted language learning course on pre-service English teachers' practice teaching. Findings indicated that the participants have benefited from the topics discussed in the course and half of them tried to make use of the CALL tools in their practice teaching. They further state that they are willing to use these tools in their future career; however, they face some problems such as lack of equipment, support and modeling. Therefore, teacher educators and the faculties need to take a serious and wary approach to the implementation of CALL as it requires close attention, critically selected software, teachers' and learners' positive attitudes.

### **Method, Sample, Instrument and Procedures**

The present study was carried out with Riyadh Teachers' College students following a randomized control-group pretest-post test design. The subjects were randomly assigned to two groups. Each group was then assigned at random to either the control group or experimental group. The treatment consisted of two levels: using computers alongside the traditional method and the traditional method alone. The experimental group undertook the first level of the treatment and the control group undertook the second level. The experimental group used the computers for three 50-minute periods a week for the eight-week duration of the experiment. Both groups were subjected to a pretest immediately before starting the experiment and the same test was administered as a posttest immediately after it.

The population of the study consisted of all students at the English Department at Riyadh Teachers' College in the second semester of the academic year 2013-2014. The sample of the study consisted of 41 students who were chosen randomly through the random sampling techniques in the statistical package SPSS. Then the 41 students were randomly assigned into experimental group (20 students) and control group (21 students).

In order to answer the question of the study, the researcher used two instruments: an instructional program and an achievement test.

#### **A-The instructional program**

After reviewing the literature and surfing the internet about designing instructional software, the researcher prepared a preliminary version of the instructional program to evaluation and measurement and three educational psychologists. Based on the remarks of the jury, the preliminary version of the instructional program was modified. The instruction program consisted of two main parts. The first part contains reading texts, explanation of the grammar items, presentation of the vocabulary items, writing exercise and dialogues. The second part of the instructional program consists of exercises and drills on the reading passages, the grammar, vocabulary items, writing and listening skills. The instructional program was tailored towards meeting the learners' needs and interests. It was developed depending on the textbooks of Interactions 2. It was used in the study with the help of a computer expert. After being designed, the instructional program was evaluated by a jury of four English language university professors, three computer experts, four specialists in instructional technology, three specialists in

#### **B- The achievement test**

The researcher developed a 50-item-multiple choice test. Test items had 4 choices, only one of which is correct. The students were instructed to answer the questions by circling the correct choice. The test included items dealing with reading texts, vocabulary questions, understanding certain grammatical constructions, and writing and listening skills. In scoring, students' achievement was computed out of 100, allotting 2 points for each correct answer and 0 for each wrong answer. The time interval between the pretest and the posttest was 8 weeks; a period long enough to minimize the effects of the pretest on the results and the conclusions of the experiment. The test was designed and administered by the researcher. The researcher himself conducted the study. An Independent-Samples t Test was used to measure the gain scores of both groups on the pretest and then on the posttest. A One-Way Analysis of Covariance (ANCONA) was used to measure the gain scores of the subjects in order to eliminate any possible differences between the two groups on the pretest.

The usability of the test was tested through a pilot study of 15 students who were excluded from the sample. The reliability coefficient of the test was calculated using Cronbach-Aalpha and was found at 0.87. The test was also given to the same jury to elicit their views as to the accuracy, clarity, and appropriateness of the instrument. Then the test was reviewed and modified according to their recommendations.

### **Findings, Discussion and Conclusion**

This study aims at investigating the effect of a computer-assisted language learning (CALL) program and measures its effect on Saudi EFL learner's achievement in English. It compares using the computer with using the traditional method. The data were collected through a pretest-treatment-posttest design for equivalent groups and analyzed via the statistical package SPSS. An independent-

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samples t test was carried out to determine whether there are any statistically significant differences between the achievement of the two groups on the pretest. Table (1) represents the results.

**Table (1)**  
**Results of the t Test of the Means of the Achievement of the Two Groups on the pretest**

PRETEST	Group	N	Mean	Standard Deviation	T	Sig.
	Control Group	21	11.619	3.154		
	Experimental Group	20	11.550	2.929		

Table (1) shows that the difference between the achievement of both groups on the pretest is not statistically significant at  $\alpha = 0.05$ . Thus, since there is no statistically significant difference between the control and experimental groups on the pretest, the two groups were assumed equivalent. Another independent-samples t test was conducted to determine whether or not there is a statistically significant difference between the two groups' achievement on the posttest. Table (2) shows the results.

**Table (2)**  
**Results of the t Test of the Means of the Achievement of the Two Groups on the posttest**

POSTTEST	Group	N	Mean	Standard Deviation	T	Sig.
	Control Group	21	24.95	2.25		
	Experimental Group	20	28.40	1.64		

Table (2) shows that there is a statistically significant difference at  $\alpha = 0.05$  between the achievement of the experimental group and that of the control group on the posttest in favor of the experimental group. This indicates that using the computer in English language instruction to the university students has a positive effect on students' achievement. The mean score for the experiment group on the posttest was 28.40 while that of the control group was 24.95.

Moreover, in spite of the fact that the difference between the achievement of the experimental group and the control group on the pretest was not statistically significant, to eliminate initial differences, a one-way ANCOVA was carried out. Table (3) shows the results.

**Table (3)**  
**Results of the Test of Between-Subjects Effects**

Source	Sum of Squares	df	Means of Squares	F	Sig.
Pretest	56.677	1	56.677	22.653	0.000
Group	123.681	1	123.681	49.433	0.000
Error	95.075	39	2.502		
Corrected Total	273.512	41			

Table (3) shows that there is a statistically significant difference between the experimental group and the control group on the posttest. The achievement of the experiment group, measured by the difference between the pretest and the posttest, was significantly better than that of the control group.

The researcher demonstrates that the difference in the achievement of the students was attributed to using computer in English language instruction. The experimental group subjects managed to significantly improved their achievement in English in a period of one semester. The improvement achieved by the control group subjects, however, was not statistically significant. By comparing the results achieved by the two groups, the researchers reached the conclusion that the improvement achieved by the experimental group may have been attributed to the way he rendered instruction; CALL.

Furthermore, the differences between the two groups may be attributed to many other reasons. First, using computer in English language instruction is a novelty. This novelty may have encouraged the students to deal with the computer enthusiastically, which may have been reflected in better achievement. Second, computers depend on programs that are based on individual learning and

consider the level and pace of the individual. This may enhance learning as the learner may feel that s(he) is in control of the whole learning process. Third, using computers allows the students to repeat the same piece of information or drill as many times as necessary for them to understand. Moreover, they are able to refer to the learning material any time they want. Fourth, using computers in instruction makes the students become less shy of committing mistakes, which encourages them to learn much better and then improve their achievements. Fifth, students using the computers might have felt that they were not being watched or judged and, thus, that the work they did was their own private property. Therefore, they were relaxed about pooling information and seeking help from other students. Sixth, the instructional material was presented in an easier way and in a sequential and logical order than that in the traditional method where the aided means are very limited. Seventh, teachers are recommended to be aware of this technological revolution, and to be up to date with its use. They should learn about computer use noticing that CALL could enhance learning in various ways and means. It gives room for group work, and elevates the level of learning. It also improves the students' achievement by giving room for interaction with the materials to be learned. Finally, computers have many positive characteristics such as speed, accuracy, variability of presentation and flexibility of use and control, which explains why it outdoes other presentation modes such as books.

Current research indicates that CALL in English language instruction will produce positive results. The findings of this study concur with the results of the studies conducted by Fletcher and Atkinson (1972), Saracho (1982), Cook (1985), Copper and Copple (1985), Stennett (1985), Kolich (1986), Kleinmann (1987), Orndorff (1987), Arroyo (1992), Hamilton (1995), Cathy (1999), Avent (1994), Chen (1996), Pigg (1996), Cantos-Gomez (1997), Machado (1997), Blankenship (1998), Campion (1999), Cunningham (2000), Smith (2000), Singhal (2001), Lasagabaster and Sierra (2003), Al-Makhzoumi and Abu Al Sha'r (2003), AbuSeileek (2004), Al Bakrawi (2005), Al Qomul (2005), AbuSeileek (2007), Al- Menei (2008) and Ferit (2009). All of these studies showed that using computer in English language instruction has positive effects that helped students improve their language skills. They also found that CALL programs do offer EFL students certain educational benefits.

### A Final Word

In the light of the findings of the present study, the researcher can say that the CALL program has a positive effect on improving the students' understanding to the course components; enhances their desire to learn English; is more interesting than the traditional method, motivates them to learn English via computer, and provides them with immediate feedback, which benefited them a lot.

Using CALL in English language instruction does have a positive impact on EFL students' performance. It built interest in the learning process, stimulated discussion, and enhanced self-confidence in the participants. It made even poor students more active and gave them the chance to show their abilities. Although it was only an experiment where the control of all variables was not possible because of its nature, the study did definitely show significant results stressing the value of the treatment. Therefore, the whole language curriculum can be organized around CALL, providing students with comprehensible and interesting language.

Although the results achieved in this study are sound and significant, the researcher found many areas of further inquiry within the framework of this study. There were questions still unanswered about this issue which could be answered in further studies. One area the researchers found lacking was the self-esteem aspect of this research. Did the CALL program build greater self-confidence in the students? Therefore, they chose to participate more actively in this competition. Further research is needed for a thorough understanding of this issue and for confirming of its findings. This is especially true when conducting research with more variables than those in the present study. It is also recommended that this study be replicated with a larger number of participants and over the whole semester or the whole year. In addition, it would be interesting to compare results across levels of proficiency as well as gender. Researchers may study the implications if experiments were carried out with younger or older school students. Moreover, there is a need to investigate whether and what theories of learning with technology could teachers adopt. In addition, further studies might describe what teachers should do with technology in their own classrooms. Research in this area should identify the needs of both language learners and instructors and the role that effective technology education and integration can play to meet learners' needs. Finally, universities, ministry of education and other educational institutes are recommended to make use and benefit from the instructional program of this study as well as similar ones when computerizing their curricula.

The possibilities for continued research in the area of CALL seem endless. With each question posed new ones arise. Each avenue that is explored, each genre that is touched leads the researcher to question, who will benefit from this technique and who will each student benefit?

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# Empirical Research on the Effect of Online Product Recommendations on Consumers' Shopping Efficiency

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**Abstract:** Online product recommendations (OPRs), which include provider recommendations (PRs) and consumer reviews (CRs), are widely used in e-business to improve consumers' shopping efficiency, which consists of product screening efficiency and product evaluation efficiency. We construct a research model to explore the effect of perceived quality of OPRs on consumers' shopping efficiency and the moderating role of product type, which usually includes search and experience product. Using an online questionnaire survey with 174 valid participants, our findings provide strong support for the proposed model. The empirical results reveal that higher perceived quality of OPRs is associated with higher consumer shopping efficiency. What's more, the impact of perceived quality of PRs on screening efficiency is stronger for experience products than for search products, but the effect of perceived quality of CRs on screening efficiency is stronger for search products than for experience products. However, the moderating effect of product type on the relationship between perceived quality of OPRs and evaluation efficiency is not significant.

## I. INTRODUCTION

In e-business, the absence of quality inspections has hindered many consumers' purchasing decisions. Therefore, many e-vendors provide system-filtered recommendations, called provider recommendations (PRs), which recommend products to consumers based on their past shopping behavior or on the preferences of other consumers. Another kind of recommendations is consumer reviews (CRs), which are written by consumers about the quality of products based on personal experiences with the products. More and more e-business websites are offering these online product recommendations (OPRs, including PRs and CRs) to assist buyers and sellers with reducing information overload and improve shopping efficiency[1]. The effects of PRs and CRs on consumers' shopping efficiency have been examined in previous literature[4-5], but the distinct effect mechanisms of both types of OPRs on consumers' online product shopping efficiency for different product types have not yet been explicitly contrasted.

In this paper, we take account of the moderating effect of product type on the relationship between quality of OPRs and consumers' shopping efficiency. Product has frequently been categorized into search and experience goods based on the possibility for consumers to assess the key qualities of a product before purchasing and consuming it[2]. Considering that consumers' behavior changes as product type changes[3], we argue that the impacts of different OPRs on shopping efficiency are different for different product type.

## II. LITERATURE REVIEW

### A. Provider Recommendations and Consumer Reviews

Provider recommendations (PRs) and consumer reviews (CRs) are defined as different types of online product recommendations (OPRs) on web sites [1]. As OPRs can provide customers with shopping assistance, they are important for both consumers and suppliers. PRs are System-filtered content extracted from statistical analyses while CRs are firsthand content provided by consumers

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[3].

PRs come from automatically and statistically processing of past buying behaviors or interest profiles in addition to providing key product attributes and descriptions whereas CRs are based on consumers-created content, which are drawn from usage experiences and are directly reported by other consumers [4]. PRs are used to provide more or less personalized product items to consumers, but CRs focus on providing feedback on a given product item. Both PRs and CRs are widely used on web sites and can help customers to make shopping decisions, but how these two types of OPRs affect shopping efficient differently for different products still remains a questions ,which is the main focus of this paper.

### B. Product Screening Efficiency and Product Evaluation Efficiency

Product shopping is the process in which consumers engage in information search and processing to decide which product to purchase to meet their specific needs. We assess consumer product shopping efficiency using two components: product screening efficiency and product evaluation efficiency.

Firstly, in the product screening process, consumers screen a large set of relevant products, without examining any of them in great depth, and identify a subset that includes the most promising alternatives, labeled a consideration set. Subsequently, in the product evaluation process, the consumer evaluates alternatives in the consideration set in more depth, performs comparisons across products on important attributes, and makes a purchase decision[5]. Therefore, product screening efficiency is defined as the efficiency incurred and value derived from online product screening. Product evaluation efficiency is defined as the efficiency incurred and value derived from online product evaluation.

### C. Product type

In this study, we categorize the product into search and experience goods. The search product was defined that consumers had actually known the quality and suitability of the product before buying it[6]. The definition of experience products are: (1) because the consumers have no direct experience to know the principal attributes of the product before purchasing, (2) compared with the direct experience of the product, it's costly or difficult to search for relevant information with mainly attributes of products, such as clothes [7]. Perceived quality of search goods relates to the property objective nature, whereas the perception of experience good depends more on the subjective attributes with a matter of personal preference[8].

## III. RESEARCH MODEL AND HYPOTHESES

Based on the extant literature and semi-structure interviews, we propose a research model, as shown in Fig. 1.

In e-commerce transactions, by guiding consumers to a set of more relevant products that are likely to match their needs, OPRs enable them to manage the large amount of information and choices available in electronic environments[9] which lead to the improvement of screening efficiency and evaluation efficiency[10]. When the PRs have a utility function that is close to that of a consumer, it can sort through thousands of options and narrow them to a handful that best match the need of the consumer. Thus, higher quality PRs enhance consumers' product screening efficiency and evaluation efficiency. Besides, consumer review are rich and influential sources of information that customers perceive as useful sources of additional information[11]. CRs possess the capability to reduce the cognitive burden of sifting through multiple options, which consequently helped better evaluate product items[12].

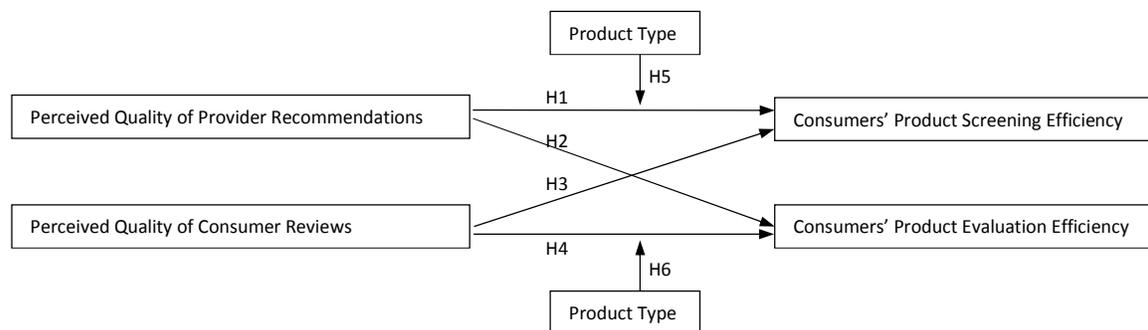


Figure 1. Research Model

Based on the above discussion, we propose the following hypotheses:

H1: Consumers' perceived quality of provider recommendations will positively affect their product screening efficiency.

H2: Consumers' perceived quality of provider recommendations will positively affect their product evaluation efficiency.

H3: Consumers' perceived quality of consumer reviews will positively affect their product screening efficiency.

H4: Consumers' perceived quality of consumer reviews will positively affect their product evaluation efficiency.

The difference between search product and experience product is not the ability of consumers to evaluate products related attributes before and after purchasing, but the methods to deal with the searched information in the shopping process. Consumers will pay more attention to the width of searching and browse more websites to acquire the product attributes in the purchase of search product. Whereas to buy experience product, consumers will emphasize the depth of searching and look over the feedback from other

consumers to obtain the product experience attributes. In light of Aggarwal, PRs may better match the information needs of search goods[13].

Based on the above discussion, we propose the following hypotheses:

H5: The product type moderates the effect of consumers' perceived quality of provider recommendations on their product screening efficiency.

H6: The product type moderates the effect of consumers' perceived quality of provider recommendations on their product evaluation efficiency.

H7: The product type moderates the effect of consumers' perceived quality of consumer reviews on their product screening efficiency.

H8: The product type moderates the effect of consumers' perceived quality of consumer reviews on their product evaluation efficiency.

#### IV. METHODOLOGY

We tested the research hypotheses through a descriptive survey using the online questionnaire in www.sojump.com. This survey included 3 sections. The first section consisted of demographic questions and online shopping behaviors. The second section was the screening question which asked the participants whether he/she pays attention to provider recommendations/consumer reviews on the website. If they answered this question as "Never", then this set of data would be eliminated during data analysis so as to remain data validity. The last section included the questions that measure the theoretical constructs. The respondents were asked to rate their level of agreement with the statements regarding their online shopping experience using a 5-point Likert-type scale response format.

182 students in university were invited to complete the survey. Of these respondents, percent of male students and female students were almost the same, 48.09 percent and 51.91 percent respectively. To ensure the data effectiveness, we eliminated the date of respondents who said they never pay attention to provider recommendations or consumer reviews and who finished the questionnaire within 90s. Based on this, we eliminated 8 sets of data and remained 174 sets of data. What's more, each set of data included the measurement of the theoretical constructs for search product and experience product both, which were divided into two sets of data later. As a result of it, ultimately there are 348 sets of data available in the data analysis.

#### V. RESULTS

##### A. The Reliability Analysis

SPSS statistical software 17.0 was used to conduct the questionnaire reliability analysis. We use Cronbach Alpha coefficients to examine the reliability. Table 1 shows the results of reliability analysis.

TABLE 1. RELIABILITY OF MEASUREMENT SCALES

Construct	Items	Alpha
Perceived Quality of Provider Recommendations	4	0.855
Perceived Quality of Consumer Reviews	4	0.862
Consumers' Product Screening Efficiency	3	0.874
Consumers' Product Evaluation Efficiency	3	0.893

##### B. The Validity Analysis

We use the extraction method of principal component analysis and the rotation method of varimax with Kaiser Normalization to analyze the validity. As shown in TABLE 2, the scale has a fairly good structural validity.

TABLE 2. ROTATED COMPONENT MATRIX

	Component			
	1	2	3	4
PR1	.136	<b>.810</b>	.145	.096
PR2	.170	<b>.836</b>	.058	.193
PR3	.245	<b>.748</b>	.215	.050
PR4	.186	<b>.779</b>	.002	.236
CR1	<b>.848</b>	.127	.157	.196
CR2	<b>.835</b>	.119	.182	.143

CR3	.706	.302	.096	.074
CR4	.789	.222	.136	.132
SE1	.244	.264	.313	.690
SE2	.170	.175	.311	.839
SE3	.138	.164	.339	.822
EE1	.157	.144	.832	.292
EE2	.160	.119	.879	.253
EE3	.234	.108	.764	.353

**C. Test of Hypotheses**

We use the structural equation model software LISREL 8.70 to test the research hypotheses H1-H4. As shown in Figure 2, hypotheses H1-H4 are all supported.

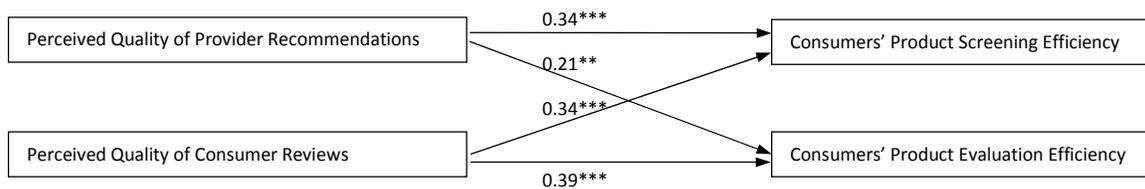


Figure 2. The Testing of Research Model

Using Awad and Ragowsky’s method [14], in order to show that a path in search product data set is significantly different from that in experience product data set, we fixed the given path in search product data set and forced the coefficient of this path to be as it was estimated in experience product data set. We then re-estimated the model for search product data set with the given changes and compared the chi-square of the model with the given path fixed to the chi-square of the model relative to the model with the given path free. If the difference in chi-squares is significant, then the path is significantly different between search product and experience product. Product type differences are shown in Table 3.

**TABLE 3. SIGNIFICANCE ANALYSIS OF PRODUCT TYPE DIFFERENCE**

Path	Former chi-square	New chi-square	Difference of freedom degree	Significance of difference in chi-square
Perceived Quality of Provider Recommendations → Product Screening Efficiency	146.63	151.65	1	5.02*
Perceived Quality of Provider Recommendations → Product Evaluation Efficiency	146.63	146.85	1	0.22
Perceived Quality of Consumer Reviews → Product Screening Efficiency	146.63	150.93	1	4.30*
Perceived Quality of Consumer Reviews → Product Evaluation Efficiency	146.63	146.64	1	0.01

According to the analysis results in Table 3, we get the following results:

(1) For experience products, there is a more positive correlation between perceived quality of provider recommendations and product screening efficiency.

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(2) There isn't significant product type difference in the effect of perceived quality of provider recommendations on product evaluation efficiency.

(3) For search products, there is a more positive correlation between perceived quality of consumer reviews and product screening efficiency.

(4) There isn't significant product type difference in the effect of perceived quality of consumer reviews on product evaluation efficiency.

Therefore, hypotheses H5 and H7 are supported, but H6 and H8 are not supported.

#### IV. DISCUSSION

The goal of this study is to deal with the following questions: What's the relationship between perceived quality of OPRs and consumers' online shopping efficiency? And do product type moderates the relationship between perceived quality of OPRs and consumers' online shopping efficiency and, if so, how? Based on the background knowledge extracted from previous literature, we extended a rich theoretical framework which explains the mechanisms how perceived quality of OPRs influence consumer's loyalty and how product type played the moderating role. Using a survey research with 174 valid participants, our findings provide strong support for the proposed model and explain significant variance in the dependent and moderating variables. And the results of this study provide several important practical implications. For instance, as the impact of PRs quality on screening efficiency is stronger for experience products than for search products, it's more suitable for online retailers to improve quality of PRs for the promotion of experience products.

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# A Conceptual Framework in B2C e-commerce: Customer Expectations and Satisfaction Relation With Online Purchasing Behavior

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## 1. Introduction

The Internet has become an essential business platform for trading and selling products. Online customer expectations grow every day, so companies are forced to adopt a more planned approach towards e-commerce. Marketers have to know what their customers expect and how best to deliver satisfaction so they can predict online purchasing behavior [1, 2].

Customers' expectations of online services have influence in the formation of satisfaction through the expectation–confirmation theory. Expectations are perceptions of future service performance and Key areas where customers have high expectations of online marketers are the following: customer service, security and privacy, website design and reliability [1]. After customers use a service, satisfaction in that area can be measured based upon their expectations [3, 4, and 5].

In the context of B2C e-commerce, Web sites services can be classified into three phases of marketing: pre, online, and after sales [6]. The pre-sales phase includes a company's efforts to attract customers by advertising and introducing their products. In the second phase purchase occurs that contains online order and payment. The after sales phase consist of customer service, delivery, and support that generate customer satisfaction by meeting their expectations [7].

The contents of this article are as follows: First, in the background part, the relationship between online customer expectation and satisfaction is explained based on two theories. Following those concepts the dimensions of customer expectations are given in detail. After that, we develop the hypotheses for the conceptual framework that is proposed to show the effect of expectation and satisfaction and other key factors on online purchasing behavior. Then, we present the methodology used in this research. The study ends with discussing the results that prove our hypotheses and suggestions for e-marketers to understand customers better and enhance their relationship with them to become more successful when developing a Web site for B2C e-commerce [8]. Also, limitations and directions for future research are given.

## 2. Background

To form a research framework for the study of online purchasing behavior we used previous research that provide us a rich foundation. As suggested by Douglas et al. (1994), strong conceptual frameworks can be developed by integrating Implications from different research traditions and disciplines [9]. In the current study, we review the prior literature of online purchasing behavior and make a new framework to better relate factors that have major influence in this context.

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Expectation-confirmation theory is the widely used and accepted theory in investigating expectations and satisfaction, which was proposed by Oliver (1977, 1980) [5, 10]. It has been applied in many fields, including marketing and consumer behavior (e.g., Kopalle & Lehmann, 2001; Szymanski & Henard, 2001) [11, 12]. This theory proves that satisfaction is a function of prior expectations and conformation; and satisfaction is a key determinant of repurchase intentions [5, 13, and 14]. The expectation-confirmation theory shows that if the perceived performance meets one's expectation, confirmation is formed and consumers are satisfied.

Another important theory that emphasizes satisfaction and involves expectations is Motivator-Hygiene Theory (also known as Two-Factor Theory). It was proposed by Herzberg, Mausner and Snyderman in their book of *The Motivation to Work* (1959). Based on this theory expectations determine customer satisfaction. Customer expectations are a set of pre-exposure beliefs about the product [15].

Key areas where customers have high expectations of online marketers are customer service, Web site design, Security and privacy, fulfilment and reliability. Major elements of a B2C web site contain ease of navigation, appropriate information, price savings, service excellence, time savings, and levels of interaction. Positive response to such factors can lead to higher satisfaction. Also, Customers now expect that if they are prepared to provide detailed personal and financial information it will be stored securely [1, 7, 16, 17, and 18].

Understanding purchasing behavior is an essential but very difficult task. As we mentioned in introduction, the purchasing process has three phases that starts before the actual purchase and continue after. Marketers have to focus on the entire process rather than on the purchase decision only [19]. Online shopping is growing every day around the world, so most of the recent research is focused on the identification and analysis of factors that one way or another can influence or even shape the online consumer's behavior [20, 21, and 22]. In this research we tried to investigate the relationship between customer expectations and satisfaction and also customer satisfaction relation with online purchase intention and totally with online purchasing behavior.

### 3. Conceptual framework and hypotheses

This research presents a conceptual framework shown in figure 1 that illustrates the factors related to online customer expectations and shows how online customer expectations, satisfaction and other key concepts affect online purchasing behavior.

#### Online customer expectations

Excellent customer service and high customer satisfaction must start with understanding customer expectations. Marketers need to know who customers are and what they want. By observing factors that customers have high expectations of online marketers, four key areas were identified. They are customer service, Web site design, Security and privacy, fulfilment and reliability [1, 7, 16, 17, 18, 24, and 25]. These factors credibility will be shown at discussion of results. These are four hypotheses about key factors in online customer expectations.

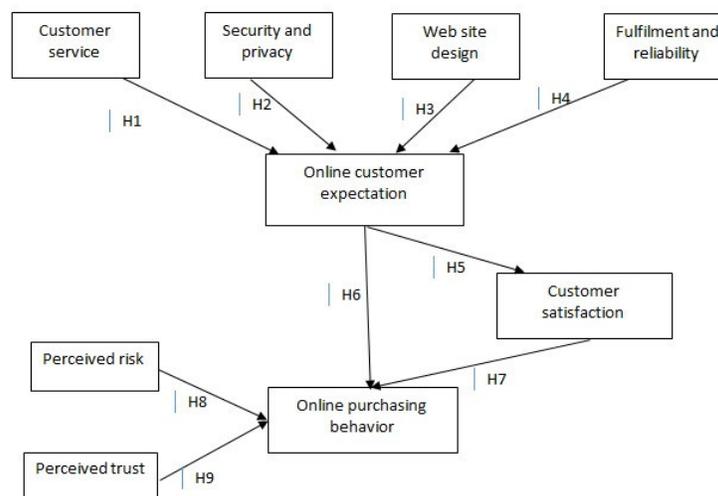
H1: customer service has a positive relationship with expectations in an online service.

H2: Security and privacy is positively related to expectations in an online service.

H3: website design has a positive relationship with expectations in an online service.

H4: fulfilment and reliability has a positive relationship with expectations in an online service.

Figure 1 a conceptual framework that shows Factors affecting the online consumer's expectation, satisfaction and online purchasing behavior



### Online buying behavior

By integrating the Expectation-confirmation Theory and the Motivator-Hygiene Theory that we explained in background, we propose the relationship between customer expectations and their satisfaction.

Expectation–confirmation theory shows the relation between expectations, confirmation, performance, satisfaction, and intentions [1, 5, and 23]. We consider the specific relationship between expectations, satisfaction and intention to find how expectations effect on satisfaction and also bring higher intention in buying behavior. We assume that the influence of expectations on satisfaction will be positive.

H5: Online customer expectations have a total positive effect on satisfaction.

H6: Online customer expectations have a total positive influence on online purchasing behavior.

Purchase intentions in online purchasing behavior are widely influenced by customer satisfaction. After purchase, if the customers are satisfied, they will have more tendency to buy again in the future. So we assume that customer satisfaction has a significant effect on online purchasing behavior.

H7: customer satisfaction has a significant positive affect on online purchasing behavior.

Also there are other key concepts that widely affect online purchasing behavior. These are perceived risk and trust. Risk and trust are multi-dimensional constructs and have been found to improve online sales effectiveness if perceived risk is reduced and trust established.

H8: perceived trust has a positive influence on online buying behavior.

H9: perceived risk has a negative influence on online buying behavior.

## 4. Methodology

This study use the results of the review of more than 35 academic papers selected from a large amount of articles on customer behavior and online purchasing intention in B2C e-commerce. The criterion for the paper selection was the focus on studying the effects of controllable (by the online marketer) factors on the online buying decision-making process. The papers selected for the review were published in credible academic journals and conferences. The controllable elements identified in the literature as influencing the online buying behavior. The selection of papers and review was done, in order to ensure the conformity of the selection criteria; a minimum of one literature reference was necessary for including a given component in the classification.

## 5. Discussion of results

Electronic commerce is quickly changing the way people do business all over the world. In the business-to-consumer area, online purchase via internet is increasing every day. Customers, not only those from well-developed countries but also those from developing countries, are getting used to the new shopping channel. Recognizing the customer expectation and factors that affect satisfaction and intention that totally form purchasing behavior, are important for researchers and marketers. Our analysis has showed some results that researchers can use to success more in this area.

**Table 1. The operational definition and supporting sources for expectations' factors**

Factors	operational definition	Sources
Customer service	Customer support, Responsiveness, Competitive Price, Helpful, Willing service, Return Policy, Immediacy of response.	[1],[7],[16],[17],[18],[25]
Security and privacy	Secure payment facilities, Privacy-secure and private personal information.	[1],[16],[17],[25]

<b>Web site design</b>	Easy navigation, Appropriate levels of information, Effective information search facility, Web Design and interface, Fast Presentation and page download, Straightforward ordering, Appropriate personalization, Appropriate product selection.	[1],[16],[17], [18],[25]
<b>Fulfilment and Reliability</b>	Can be depended on to provide whatever is promised. Reliability of the information content: Diversity, depth and actuality of information contents, Reliability in control and use of technology: Delivery of the right product within promised time frame.	[1],[7],[25]

In table 1 key factors of online customer expectation, their definition and supporting sources are shown. Analysis of the findings of this research shows that online customer expectations are influenced by four hypothesis that were mentioned at conceptual framework. Each factor is defined and proved by at least three sources.

By analysis of our finding about expectation and its effect on satisfaction, we focus on the specific relationship between expectations, satisfaction in expectation–confirmation model to show expectations effect on satisfaction. Some researchers have different idea that expectations have a negative impact on satisfaction, given the basic formulation of the expectation– confirmation model that higher expectations lead to more negative confirmation and lower satisfaction. Others say that expectations have a positive influence on satisfaction through performance because perceptions of performance assimilate toward expectations, and performance itself has a positive influence on satisfaction [2, 26, and 27]. So, customer with higher expectations will have higher satisfaction [28].

Spreng et al. [26] find that the basic relationship among expectations and satisfaction is positive in many marketing studies, suggesting an overall positive influence of expectations on satisfaction. By reviewing prior online service research, we find that online service expectations have a total positive effect on satisfaction [24, 28, and 29]. So, we settled that the influence of expectations on satisfaction will be positive.

The results about online purchasing behaviors' factors are shown in Tables 2.

**Table 2. The definition and supporting sources for purchasing behaviors' factors**

<b>Factors</b>	<b>operational definition</b>	<b>Sources</b>
<b>Satisfaction</b>	General feedback on the web site design, Competitive price of the product, Merchandise availability, Merchandise condition, On-time delivery, Merchandise return policy, Customer support, E-mail confirmation on customer order, Promotion activities.	[25],[30]
<b>Expectation</b>	Customer service, Security and privacy, Timeliness, Availability, Convenience.	[1],[24]

perceived trust	A set of expectations that lead to behavioral Intentions, Willingness to depend on web site.	[11],[17],[31]
perceived risk	Lack of assurance and trust.	[1],[8]

According to researches results is has been given that customer satisfaction has a significant effect on online purchasing behavior, when they decide to purchase a product their prior satisfaction play an important role there [25, 30].

Willingness to purchase is considered to be inversely affected by perceived risk. Stone and Gronhaug (1993) state that 'risk is the subjective expectation of a loss'. On the other side there is trust as it is a potential outcome of risk reduction. If marketers want to succeed, trust needs to be increased and perceived risk decreased [1, 24]. Also, importance of trust in e-commerce is argued and proved in purchase intention [11, 17, and 31]. Consumer's attitude to risks affect the buying intention. In addition, numerous studies indicated that all factors used for lowering risks influence consumers purchasing behavior [1, 8].

### 6. Limitations and future research

However this research prepare a conceptual framework to show the relation between customer expectation, satisfaction and online buying behavior, there are still some limitations and a need for additional research be included and the effects may be retested. Considering the developing online market conditions, it is necessary to focus on new channels to deliver services that affect customer expectations, satisfaction and online buying behavior.

Future research can use our conceptual framework as a basis to their empirical research to prove the factors affecting the online consumer purchasing behavior. One possible future study in this case can be done by finding and testing more relationships between factors.

### 7. Conclusion

The purpose of this study was to show a series of new relationship in B2C context of online purchasing behavior. In summary, this research provides a conceptual framework to better understand customer expectations, and how it leads to satisfaction, and also their influence on online buying behavior. The results of this study provide support for the hypotheses proposed at the beginning, it shows four key factors that form online customer expectation: customer service, Web site design, Security and privacy, fulfilment and reliability. It also shows that online customer expectations have a total positive effect on satisfaction and online purchasing behavior. The other results are satisfaction has influence on online purchasing behavior and perceived trust needs to be increased and perceived risk decreased for higher purchasing intention.

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# A Study on the Effect of Combination of Pair Programming with Learning Styles on Students Learning Motivation

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**Abstract:** Peer tutoring strategy changes the role of instructors no matter what the instructor is an educator or a peer. The well-known method in computer science education, pair programming, is some kind of effective collaborative peer tutoring activity. The advantages of peer tutoring method emphasize similar prior knowledge and languages among peers so as to achieve teaching goals. Data Structure is a very important basic curriculum, regarded as a mandatory course in relevant computer domains of university. However, most of students fail to present their coding skills after learning data structure course. Cooperative learning is an effective learning strategy in which is often applied to education field. Students must work in groups to complete tasks collectively toward academic goals. Pair Programming could decrease errors in coding, increase coding quality and promote programmers confidence, as well as enhance their coding ability. This study incorporates an experimental learning activity, in which the students are asked to write programming codes, which can enhance students' learning motivation. Then, this study compares the performance of the students with different learning styles in learning motivation. According the results of Two-way ANOVA, the proposed intervention could increase students learning performance. The reflective-style students could have better learning achievement than active-style ones.

## I. INTRODUCTION

Cooperative learning is an effective learning strategy in which is often applied to education field. Students must work in groups to complete tasks collectively toward academic goals. Unlike individual learning, which can be competitive in nature, students learning cooperatively can capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, exploring, thinking, reasoning and solving problems etc.). Those who have better interactive skills could help others learn interaction skills [1-3].

Peer tutoring is an instructional strategy that facilitates students to help others learn material and then understand better the material being studied [4]. The pairing of higher- and lower- achieving students offers students more opportunities for repeated practice and supplementary learning, which benefit the both parties and save the instructor's time, through one-on-one activities. Learning style is an important factor that affects learning [5]. Learners acquire knowledge in different ways, which forms different learning styles [6]. Study stated that instructors can adjust their teaching instruction to comply with different learning preferences and styles and then enhance students' learning motivation and achievement [7]. Pair programming is a collaborative concept to write programming[8]. Peer tutoring changes the instruction way of both conventional and collaborative learning. Pair programming is an agile software

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development technique in which two programmers work as a pair together on one workstation. One, the driver, is charged for writing code and usually works as the role of a student, while the other, the observer, is responsible for reviewing each line of code as it is typed and usually works as a role of an educator (Forte & Guzdial, 2005). Forte and Guzdial (2005) indicate that it is a tough learning activity to learning programming course but pair programming can be used instead, in which students are able to gain better learning performance actively.

It is often used to the course of computer programming. Thus, the participants are designated as two characters with different characteristics: the driver and navigator in the pair programming activity of this study. This study investigates whether the participants with different learning styles can effectively play different roles or not in the experimental activity.

## II. LITERATURE REVIEW

### A. Learning Style

Felder and Silverman (1988) divide learning styles into four groups, eight categories- Actively and Reflectively, Sensory and Intuitive, Visual and Verbal, Sequentially and Globally etc., based on four aspects of learning process, information processing, perception, input and understanding. Felder pointed that learning styles denote a learner's learning way of accepting and dealing with outside messages of the world. Classification of learning style is based on the degree of learner's information receiving and information processing. That is, active or reflective, sensing or intuitive, inductive or deductive, and sequential or global are classified to the feature of information processing; while visual or verbal is inclined to the feature of the feature of communication.

In the study, questionnaire of learning style is employed to decide learners' learning style with either active-type or reflective-type, and then decide what role will be arranged to double pair match in the programming game.

### B. Pair programming

Pair programming, an important teaching approach in higher education, is a collaborative method for developing software [9]. Learning programming may be difficult to a beginner so as to decrease their learning motivation. With the assistance of collaborative learning, student learning motivation, better understanding of programming, higher morale and more interests could be enhanced.

## III. RESEARCH DESIGN

This study incorporates an experimental learning activity, in which the students are asked to write programming codes, share ideas, and put what they learn into practice as a pair together at one workstation in a Data Structure course.

### C. Participants

This study recruits 90 sophomore college students from the Department of Information Management to participate in the pair programming experiment of this study. The participants with an information management, information technology, or information and electrical engineering measure are randomly selected from the two classes. The participants are paired based on their learning style preferences. The instructor assigns a programming-coding assignment to the participants, which should be completed in each pair programming activity. The participants are also required to complete the ARCS Motivation [10] Questionnaire before and after the experiment and the ILS [11] before the experiment. Table 1 shows the details of the pair programming experiment. The research objectives of this study are as follows.

1. This study investigates the participants' learning motivation before and after the pair programming experiment in the Data Structure course.
2. This study investigates the participants' learning outcomes after the pair programming experiment in the Data Structure course.
3. This study investigates that the effects of the roles that participants with different learning styles play in the pair programming experiment have on learning motivation.

**TABLE I**  
**THE DETAILS OF THE PAIR PROGRAMMING EXPERIMENT**

	Experimental Activity	Time
Preparation	1 <sup>st</sup> -3 <sup>rd</sup> week: Learning about Data Structure in the first two classes and having a quiz in the third class	50 min./each class
Pre-test	4 <sup>th</sup> week: Completing the pre-test (The ARCS Motivation Questionnaire and the Index of Learning Styles (ILS))	20 min. and 20 min.
Experimental Implementation	5 <sup>th</sup> -7 <sup>th</sup> week: Learning about Data Structure in the first two classes and performing the pair programming activities in	50 min./each class

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	the third class	
Post-test	8 <sup>th</sup> week: Completing the post-test (The ARCS Motivation Questionnaire)	20 min.
Outcome	9 <sup>th</sup> week: Midterm exam	50 min.

**D. Measuring tools**

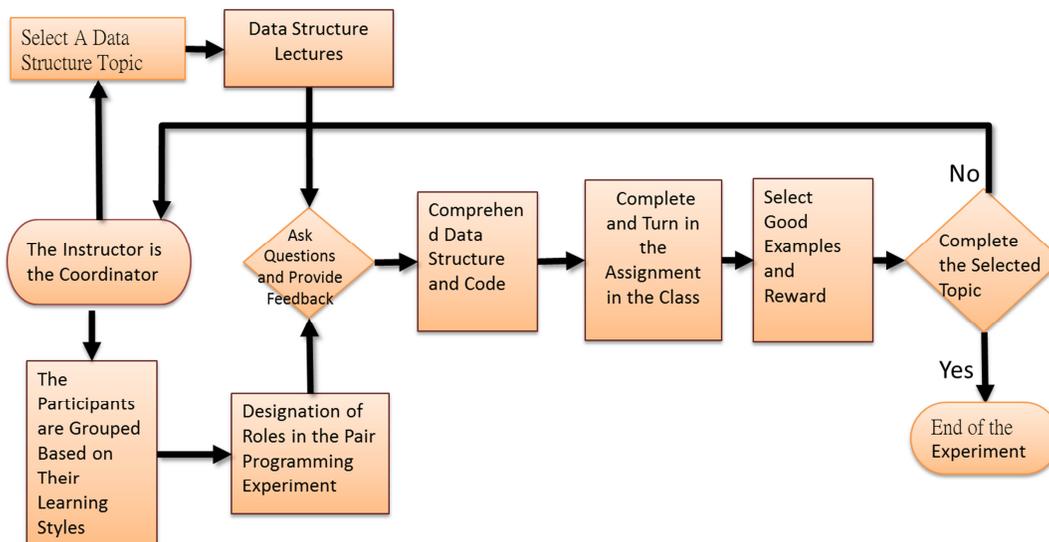
The Felder-Soloman Index of learning style (ILS) was adopted from Felder and Silverman. Zywno [12] indicated that the reliability and validity were positively examined; in addition, test-retest reliability in four dimensions are .683, .679, .511, and .507, respectively. The reliability and construct validity are all supported. The learning style questionnaire for Felder-Silverman Model consists of four dimensions of learning preference. They are active or reflective, sensing or intuitive, visual or verbal, inductive or deductive, and sequential or global.

**E. Activities Processing**

The framework of this study is shown as Figure 1. The instructor is the coordinator and determines the specific topics of the Data Structure course for the participants in this experiment. This study investigates that the effects of different learning styles and achievement have on the students' learning motivation and retention. The participants are required to complete the ILS questionnaire before the experiment and then designated as the drivers or navigators based on their learning styles in the pair programming experiment. Active and reflective students in information processing are designated as the drivers and navigators, respectively, in the experimental groups of the pair programming experiment (Figure 2). The remaining participants are paired and designated as the drivers or navigators based on their academic performance in the control groups of the pair programming experiment. Then, the instructor lectures about coding topics related to data structure and encourages the participants to ask questions and provide feedback, which ensure that the students are fully comprehend the coding topics. The experimental and control groups have to complete the coding assignment in class.

**F. Experimental design**

The three topics of data structures in this study were the stack, the queue, and the binary tree. First, before the learning activity, the ARCS questions were distributed to students to examine their level of motivation. Then, the three learning activities were implemented within three weeks. In the fifth week, students were chosen to complete the questionnaire of motivation and to test their memory retention. Computer program annotation was taken to analyze the research findings and point out any possible limitations. In line with students' programming ability based on their achievement scores, the higher-level students were asked to work with the lower-level students in pairs.



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Figure 1. The Framework of This Study



Figure 2. Pair Programming Activity

#### IV. EXPERIMENTAL RESULTS AND ANALYSIS

The analysis results show that the participants' mean score on the learning motivation is 3.53 in the post-test, which is higher than that of 3.16 in the pre-test and indicates the increase of the participants' learning motivation in the experiment. In considering the four pillars of attention, relevance, confidence, and satisfaction (ARCS), the participants' mean scores on the four pillars all positively increase, especially on satisfaction with the highest mean score of 3.61 and  $P = <0.001$ , which indicates that the participants have positive feeling toward the pair programming experiment. The mean score on attention is 3.54 in the post-test with most of the increase in ARCS, which indicates that the participants can better apply what they have learned in class to writing programming codes.

TABLE II  
T-TEST RESULTS OF ARCS MOTIVATION

	Attention		Relevance		Confidence		Satisfaction	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
pre-test	2.98	.629	3.29	.54	3.14	.62	3.24	.53
post-test	3.54	.702***	3.58	.69***	3.40	.74**	3.61	.56***

\*\* $p < 0.01$ , \*\*\* $p < .0001$

In the study, active-type learning style of students were arranged as the drivers, while reflective-type ones as the observers. ARCS were conducted before and after the intervention. Three learning activities, stack, queue, and binary, were involved in the post test stage with paper-based annotation assessment.

The assessment results are shown in Table 3, in which main effect of learning style show significant difference ( $F = 8.053$ ,  $p = 0.006 < 0.01$ ), while main effect of role doesn't reach the significant difference ( $F = 0.508$ ,  $p = 0.478 > 0.1$ ). However, interactive effect between learning style and role reach significant difference ( $F = 4.476$ ,  $p = 0.038 < 0.05$ ), indicating that student with different learning styles could achieve different learning performance based on the different roles of pair programming activity.

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**TABLE III**  
**TWO-WAY ANOVA OF POSTTEST WITH LEARNING STYLE AND ROLE**

Source	Type III		Mean Square	F	p
	Sum of squares	df			
Learning style	751.025	1	751.025	8.053	.006
role	47.339	1	47.339	.508	.478
Learning style * role	417.474	1	417.474	4.476	.038
Error	6994.836	75	93.264		

### V. CONCLUSIONS AND FUTURE WORKS

Many studies show that pair programming can improve students' learning performance and efficiency, such as less mistake, better design, and shorter codes [13-16]. Pair programming is one of the most successful evidence-based collaborative learning methods for programming related courses. However, the motivation issues of pair programming on computer science education studies, especially to data structure courses, are rarely explored in the literature. This paper explores issues of student motivation in data structure courses by a pair programming activity with motivation questionnaires. The ARCS questionnaire was used to evaluate students' initial motivation on attention, relevance, confidence, and satisfaction dimensions.

According to the results of Two-way ANOVA, the proposed intervention could increase students' learning performance. The reflective-style students could have better learning achievement than active-style ones. From the view of role of learning activity, the reflective-style students are suitable to the role of observers because of better achievement, while the active-style students would decrease their performance. As the role of drivers, non-significant difference would occur between two learning styles of students in learning achievement.

The findings suggest that the effects of pair programming activities can be leveraged based on an understanding of students' motivation for and retention of learning. In the future, we will refine the grouping guidelines for pair programming to improve group-learning performance. Furthermore, we will investigate whether other learning styles could provide more precise prediction for pair programming.

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# A Centralized Multimodal Authentication Platform with trust model approach for securing federal e-government budgets services and applications

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**Abstract:** In recent years, there has been rapid growth of e-government services & application go on web. Malaysia federal government enable national budget services and application online for more efficient on managing, planning, monitoring, evaluation and accountability. The information and data was used by the application are high confidential and very important for country. The need to develop strong policy and technical mechanisms to improve the security of and enable secure communications for applications on the web. One of the research output from local research institute (MIMOS) was identify and deployed to enhance and protect the system and confidential data. Centralized multimodal authentication platform with trust model approach was used to secure and protect the federal e-government budgets services and applications.

## I. INTRODUCTION

Recently, most of the government around the world including Malaysia government have initiated their e-government strategies to exploit and use Information Communication Technologies (ICT), e-commerce models and best practice to fully integrate most of the e-government services and turn in online. The main objective is to improve the government operations and support citizens through use of web technologies to public sector and e-government digital contents.

One of the Malaysia government effort and initiative is use ICT & best practice to increase efficiency and effectiveness of the national budgets system and programs. The outcome based budget (OBB) system was developed with a well-structured national level strategic plan lays the foundation for focused sector and program levels plans and allow ministries and departments to establish linkages to higher-level key results areas. Part of the functional on this system provides baseline data that allow measurement of comparable progress and results at predetermined intervals. Performance data are explicitly focused on measuring performance progress areas such as key result areas (KRAs), goals, objectives, outcomes, outputs, and activities. Such performance data are monitored against predetermined targets. This budgeting system is critical to meeting Malaysia's national needs and the challenges of globalization and regional competition.

When the e-government critical and important system such as outcome based budget system go online and accessible via public network, the increases and need of regulatory security requirements for the protection of confidential data and strong authentication to measure the authorization personal only can accessible to the resources and confidential data. The e-government services providing their citizen services and offering internet-based services should use secure and efficient methods of authentication to protect the confidential data.

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Accessing today's most of the e-government web-based online system requires a user friendly and convenience methods which is depend on username name & password to authenticate the user identity. This methods is a significant vulnerability since the user password can be easy captured by the man in the middle attack and later used for making illegal access to the user account.

## II. BACKGROUND

The Outcome based budget (OBB) system was introduced and has been established in the Ministry of Finance Malaysia in year 2011 [1]. Malaysia is not a first country in reforming the budgeting system, OBB has been successfully implemented in a number of countries such as Canada, Singapore and New Zealand. Malaysia introduce and implemented of OBB can be seen as another effort by the Malaysia government to reform the budgeting system to better manage and achieve results. It success will hinge upon translating the theory into practice with cooperation of all in the Malaysian public sector. OBB also will ensure value for money when duplication of resources across ministries is eliminated. The estimated benefits obtains from OBB included online budget preparation, analytical reporting on budget usage and results, integration of workflow management and audit trails.

Under OBB, the application named "MyResults" [2] URL (<https://www.myresults.gov.my/>) was developed not solely for the preparation of the budget, but as a strategic planning tool and public sector performance management comprehensive. MyResults provides users with framework structures for monitoring& evaluation, online budget submission, review & verification, performance monitoring and reporting. With MyResults application, all the ministry will have an online access to information about its program objectives, resources utilization, activity completion, output generation, outcomes and impact achievement from the system and also can be used for evaluation purpose.

Authentication is a complex problems. E-government systems need to authenticate users to back-end data sources and applications, yet these applications may each have different underlying security infrastructures. And the ideal and most efficient authentication solution is a single sign-on one, or SSO, in which the user only has to log in once and is authenticated to all of the network resources. Many techniques for authentication don't work or don't work very well for Internet based applications. In this discussion, my goal will be to describe some of the high-level challenges and solutions found in implementing a national centralized multifactor authentication and Single-Sign-On for e-government web based applications. The desired scenario for e-government authentication framework with multiple web applications require optimized and centralized multi-factor authentication with single sign-on capabilities across a wide variety of e-government services and functions.

## V. UAP SYSTEM ARCHITECTURE

The centralized multimodal authentication system based on new authentication platform that is provide both secure and highly usable. With combination of our trust model approach to enforce another security level even though use with the traditional username password authentication method. The system provides a highly secure environment that is simple to use and deploy with the limited resources that does not require any change in infrastructure and communication protocol.

To adopt UAP trust model approach & adaptive authentication features, application developers need to modify and separate the authentication module and rely on the central module as the main source. This is what we mention early advised de-couples authentication mechanism from application. This is moving towards a trusted model where a central application handles all types of authentication for an organization.

### I. Trust Model Approach

Using UAP, application can define required trust level while UAP system evaluates user trust level based on authentication methods used. User is only allowed to login to application if the evaluated trust level exceeds application required trust level.

### II. Adaptive Authentication

User is required to provide additional authentication if the trust level is less than application required trust level.

## V. DEPLOYMENT MYRESULTS APPLICATION AND UAP SYSTEM

UAP and MyResults application already deployed as production few years ago but recently deployed with our trust model approach. In this section, we have defined and explains two different type of MyResults application system architecture. One model configure as low trust model which sufficient for basic security requirements and other model configure as high trust model to be establish as high security requirement.

With trust model approach, MyResults application can define required trust level and while UAP authentication server evaluates user trust level based on authentication methods used. Users is only allowed to login to MyResults application if the evaluated trust level exceeds MyResults application required trust level.

According to our best practice on assigning the weightages on trust level, the authentication methods or credentials are ranked based on their security strength and given weightages system also allow application to have different requirement trust level. In current production server, UAP system have turn on three authentication methods, which are password, OTP token and SMS OTP.

### a. Password.

The most basic authentication method relied on the user chooses it and something that fits in the memory of a user. This method of authentication is about verifying the user physical identity remotely, and the user behavior is necessarily involved throughout the process. Trust level assign to this authentication method is with value 13.

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### b. OTP Token

A password that is valid for only one login session or per single transaction. OTP numbers are difficult for human beings to memorize. Therefore, they require additional technology and hardware token in order to work. OTP device creates a "two-factor" security system which means you'll have to know something (your user name) and to have something (the OTP security token) in order to login into the authentication. Trust level assign to this authentication method is with value 20.

### c. SMS OTP

The method used to authenticate user based on the non-reusable random generated mobile Short Message System (SMS) OTP deliver to a user via SMS. Mobile SMS OTP will only be valid per login session. This method also creates a "two-factor" security system, which the mobile SMS OTP and the user mobile phone to receive the mobile OTP via the SMS network. Trust level assign to this authentication method is with value 18.

#### A. UAP and low trust MyResults Application System Architecture

UAP with the trust modal approach provided better security protection for users and application. We have successfully deployed this new architecture for MyResults application with UAP. Figure 5 shows the detail flows of UAP low trust model with MyResults application system architecture and also how UAP provided security protection to the applications. In the system architecture diagram Figure 1 show the trust level of MyResults Application set it to value 10, for the three authentication methods trust level value already define above this section.

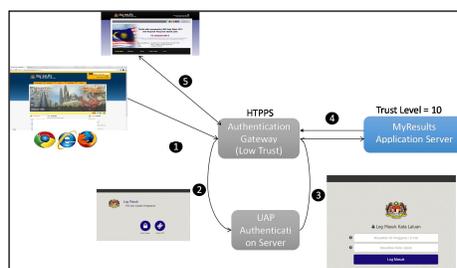


Figure 1: UAP Low Trust model with MyResults Application System Architecture

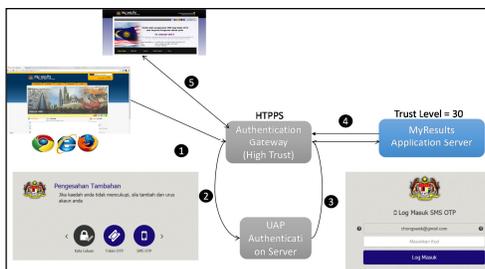
Let's begin with the user access to MyResults application via the URL <https://www.myresults.gov.my>. The user arriving at the UAP gateway which configure as Low Trust model. We assume the user reached the gateway without an existing session and without any information about the user identity. Information about user identity is sent from UAP authentication server to UAP gateway which prepared the information for protection information contents use by applications.

For better understanding, the author describe the system architecture with step by step transaction flows from beginning until authorized user granted access protected resources. For this trust model approach, we use the trust level defined early which included trust level for authentication methods and MyResults application.

1. User accessing the MyResults application and user arriving at UAP gateway. UAP gateway unable to detect the authentication session, UAP gateway will redirect to UAP authentication server via user browser.
2. When user redirect to authentication server, the authentication server present the authentication page for user to choose prefer authentication methods login to the system. In this deployment, low trust gateway configured and make available only password and OTP token authentication method.
3. If the scenario user choose the password authentication method and successfully provided the credential for authentication, user will redirect back to UAP gateway via browser.
4. When arriving UAP gateway, UAP gateway will do verification and evaluation on trust level requirement between users choose authentication method and MyResults Application. In this case, trust specification require for MyResults application is set to minimum trust level 10. Trust established based on authentication input, this scenario user authentication input is password which carry trust level 13.
5. In this scenario, the user authentication evaluation result exceeds the minimum security requirement of MyResult application. This mean that user can access MyResults application & resources with the user's permission granted by application and based on trust level up to the application trust specification.

#### B. UAP and high trust MyResults Application System Architecture

We assume the user reached the gateway with an existing session and information about the user identity. Information about user identity is sent from UAP authentication server to UAP gateway which prepared the information for protection sensitive information contents use by applications. Figure 2 shows the UAP high trust model with MyResults application system architecture which deployed for security protection on sensitive data and application resources. In this scenario high trust model, the security requirement for MyResults application trust specification set it to trust level 30 which is higher compare with low trust model.



**Figure 2: UAP High Trust model with MyResults Application System Architecture**

In this scenario, we use the same trust level defined early for authentication methods and also MyResult application high trust security requirement trust specification defined in Figure 2. We create a scenario, user already authentication and granted access MyResults low trust application. When the user require accessing the sensitive resources or doing approval activities, MyResults application will redirect user to accessing the high trust UAP gateway. Below is the detail steps how the users being redirect to UAP high trust gateway and evaluation the security requirement and grant access to sensitive resources.

1. User accessing the MyResults application and user arriving at UAP high trust gateway. UAP gateway able to detect current authentication session and user identity, user is required to provide additional authentication because current authentication method trust level is less than application required trust level. UAP high trust gateway will redirect to UAP authentication server via user browser for additional authentication.
2. In this scenario, user already authentication using password but current input authentication method cannot meet the MyResults high trust application minimum security requirement specification. For this deployment, extra authentication method which is SMS OTP make available for user to choose when UAP authentication system require user for second authentication. The previous authentication methods already used will mark and cannot be used as second authentication. In the case, user choose SMS OTP method for second authentication.
3. User prompt for enter SMS OTP value which send by authentication server to user mobile phone via SMS. If user successfully authenticated, user will redirect back to UAP high trust gateway via browser.
4. When arriving UAP high trust gateway, the gateway will perform verification and evaluation on trust level requirement between users choose authentication method and MyResults application. In this case, trust specification require for MyResults application is set to minimum trust level 30. Trust established based on the first authentication input password carry trust level 13 and second authentication input SMS OTP carry trust level 18. In this scenario, total trust value for user authentication after successfully additional authentication is increase to trust level 31.
5. In this scenario, the user authentication evaluation result exceeds the minimum security requirement of MyResult application. This mean that user can access MyResults application and access to sensitive resources or approval pages with the user's permission granted by application based on trust level up to the application specification.

## VI. CONCLUSION

To adopt UAP, application developers need to modify and separate the authentication module and rely on the central module as the main source. This is moving towards a trusted model where a central application handles all types of authentication for an organization. User is required to provide additional authentication input if the trust level is less than application required trust level. User is only allowed to login to application if the evaluated trust level exceeds application required trust level.

With this model, new authentication method can be added without any modification to all the applications. Existing authentication method with newly discovered vulnerability can be disabled instantaneously, time responsive to threat will decrease. Successfully deployed UAP with MyResults application, Ministry of Finance Malaysia confident with enabling other MOF related e-government applications using UAP authentication platform with trust model.

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## Voice Command E-Commerce

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**Abstract:** E-Commerce is a system which has bought a revolution in the business world and also in life of individuals as they can simply order by using the internet and need not go and search in shops. This paper is about advancement in E-Commerce and will show how the new technology in E-Commerce will be. In this new system most easy part is that the product reviews of all the online shopping sites will be shown in a single page and the user need not search every online site for reviews and user can complete the order by interacting with computer by the voice of the user. This is very easy to adopt by any user.

**Keywords:** web content mining, opinion mining, Annyang

### I. INTRODUCTION

E-Commerce is trading of products by internet network/telecommunications which involves Electronic Fund transfer. As the name defines E is defined for Electronic and commerce means transaction of goods and services.

The present system of e-commerce is very helpful for every individual but every technology needs improvement. Every system contains a drawback and the one of the drawbacks is the prices and reviews of a product may be different in online shopping site and a buyer has to search in other online shopping sites. So it will be difficult for the buyer to search all the other online shopping sites. The present system may not be used for the people who are handicapped and people who are not very familiar with usage of computers. In the proposed system the drawbacks can be overcome by using the web content mining software and the reviews can be easily given by opinion mining and a device called voice command device which is used in this system to help the handicapped people by which one can easily do the order by voice as his input. This can bring advancement in E-Commerce.

### II. PREVIOUS EXISTING SOLUTIONS:

#### Present existing Online E-Commerce:

In present e-commerce system there will be many online shopping sites and a product's cost and reviews will be different in every shopping site and the user have to study product review and cost from every online shopping site and then have to decide and order it. In this system the user have to complete the order by going into each and every page like online payment, shipping address etc... The order will be completed by interacting with computer through mouse and keyboard which by usage of hand.

Drawback of the system:

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- The cost of the product and shipping charges may not be same in every online shopping site and reviews and ratings also will not be the same. It will be difficult for the buyer to go through different online shopping sites as it is time consuming.
- The buyer has to complete the order by hand using the mouse and keyboard and this will not be possible for handicapped especially blind people and some other people who don't know about the usage of computers and internet so they may have take some others help to order the product.

### III. EQUIPMENT FOR PROPOSED SYSTEM

Microphone: it is used to give the input of speech

Annyang: Annyang is a tiny java script library which will allow the user to control the web application/website by voice commands. It allows multiple languages and it's a size of 1kb.

Web application: A [web application](#) is any application that uses a web browser as a client.

Web content mining: Web content mining is the mining, extraction and integration of useful data, information and knowledge from internet. It is the extended work performed by search engines. In this there will be using Agent based approach in that there are three types of agents those are Intelligent search agents, Information filtering/Categorizing agent and Personalized web agents .

Intelligent Search agents automatically searches for information according to a particular query using domain characteristics and user profiles.

Information agents used number of techniques to filter data according to the predefine instructions.

Personalized web agents learn user preferences and discovers documents related to those user profiles

Opinion mining: This is the software used to give the opinion of a product based on the reviews which will help the buyer to choose the online shopping site by seeing the reviews of product from online shopping sites displayed.

There are four tools required to complete this process

Review Seer tool – This tool automates the work done by aggregation sites. The Naive Bayes classifier approach is used to collect positive and negative opinions for assigning a score to the extracted feature terms.

Web Fountain - It uses the beginning definite Base Noun Phrase (bBNP) heuristic approach for extracting the product features.

Red Opal –It is a tool that enables the users to determine the opinion orientations of products based on their features. It assigns the scores to each product based on features extracted from the customer reviews'

Opinion observer-This is an opinion mining system for analyzing and comparing opinions on the Internet using user generated contents. This system shows the results in a graph format showing opinion of the product feature by feature.

The complete system is shown in the Block Diagram below and the working of the system will be explained in the other section. This is the system which can be easily adoptable by every person who uses the E-Commerce for getting the goods.

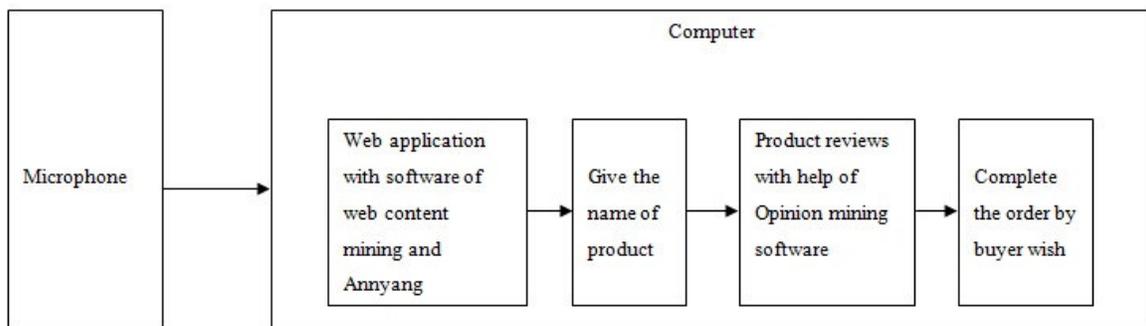


Figure.1 Proposed System

#### IV. IMPLEMENTATION OF PROPOSED SYSTEM

In the implementation of the proposed system firstly a web application is created and appears on desktop of computer with inbuilt software called web content mining which is the extended work performed for search engines and it is used to easily find the required product from different online shopping sites and integrate the data and a java script called Annyang is added to the webapp which is a java script through which user can control the web app by speech. In this app there is one more software called opinion mining which will help in finding the reviews and ratings of a product so the buyer can easily make out the decision by the reviews and ratings from every online shopping site and also company sites .

If a person wants to buy a product through E-Commerce he has to search the product in every online shopping site and he has to use the keyboard and mouse. This is very time consuming and also may not help the handicapped people and also this system will be helpful for the normal people in village who does not have knowledge of operating computer, can be more beneficial with this system

So the proposed system is a advancement for that if a buyer wants to buy a product he can give the voice command to open the web app through microphone and the web app will open and the buyer will give the name of the product by voice through microphone and the web app which is with softwares called web content mining and opinion mining will give the product given by buyer with reviews of the product from different shopping sites by the reviews he will decide to buy from which site and will complete the order by voice and there will be a voice back during the completion of order for confirmation details.

So this system will definitely be useful and definitely will be a advancement in E-Commerce.

#### V. CONCLUSION

Finally I conclude this system will be advancement in E-Commerce and this system will definitely make the buyer less time consuming and provide easy way of ordering. This system will be helpful not only in commercial way and also in helping the individuals.

In future development instead of a webapp a Mobile app will be created and this system will be implemented on the mobiles and in later stage a G-translate can also be placed so that it can help the people who are not familiar with English and only know the native language can be able to place the order.

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## Technological Acceptance and Consumer's Behavior on Buying Online Insurance

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**Abstract:** This research aims to study consumer's behavior on buying online car casualty insurance. The sample group was 400 respondents which were selected by convenience sampling method. Questionnaires were used as a research instrument while chi square was used as a statistical tool for the hypothesis testing. The research revealed two major findings which were 1) there were significant differences between customer's technological acceptance and consumer's behavior on buying online car casualty insurance and 2) there were significant differences between customer's trust and consumer's behavior as well.

**Keywords:** Consumer's Behavior, Online Insurance, Technological Acceptance

### I. INTRODUCTION

In order to do the business in the past, firms mostly invested in infrastructures and location since these factors helped customers to easily access to firms, and this could lead firms to gain more profits. However, world technologies have been rapidly developed. The integration and the development of information technology create opportunities for both big and small firms to access their customers around the globe. Moreover, they also support those firms to work together as we could see many companies promoting their strategic alliances. It can be seen that e-Commerce appears to be a critical choice of companies in terms of improving their effective works, especially customer service matter. E-commerce furthermore creates customer responsiveness which helps companies to respond customer faster, and this could lead to customer's satisfaction. In addition, e-Commerce can also help companies to reduce dramatic costs. Therefore, it can be seen that companies gain various benefit from the e-Commerce mentioned earlier, and in the meantime, this could champion companies to gain sustainable competitive advantage.

Casualty insurance or disaster insurance is one of the businesses that has extremely growth. In Thailand, car insurance business is a very successful business since the demand of Thai drivers have increased every year [1] Many vehicle companies have tried to introduce various budget cars which stimulate consumer demand. The Thai insurance [2] reports that many casualty insurance companies tend to increase their sales volume by using e-Commerce as a channel of distribution. Nevertheless, there are still many people who do not trust this channel deal to different reasons such as its risks and quality. Therefore, this research aims to study consumer's behavior on buying online car casualty insurance by applying the technological acceptance model (TAM) to create acceptance framework focusing on customer's technological acceptance and customer's trust. This study will help insurance companies to have more comprehend on their customer's behavior on buying online business and it could definitely help companies to create their strategic plan in order to respond to the needs of customer.

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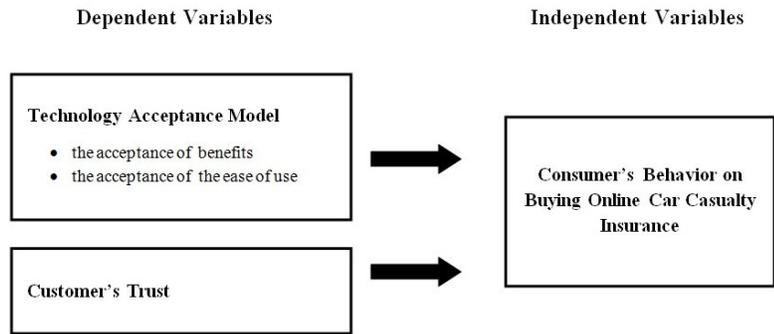
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**A. Objectives of the Study**

This research has three main objectives as follows:

- 1) To study consumer’s behavior on buying online car casualty insurance.
- 2) To study customer’s technological acceptance which influences consumer’s behavior on buying online car casualty insurance.
- 3) To study customer’s trust which influence consumer’s behavior on buying online car casualty insurance.

**II. RESEARCH FRAMEWORK**



**Figure 1. Research Framework.**

**III. RESEARCH HYPOTHESIS**

- 1) There were significant differences between customer’s technological acceptance in terms of the acceptance of benefits and consumer’s behavior in terms of reasons of buying and period of buying car
- 2) There were significant differences between customer’s technological acceptance in terms of the acceptance of benefits and consumer’s behavior
- 3) There were significant differences between customer’s trust and the consumer’s behavior

**IV. RELEVANT CONCEPTS AND THEORIES**

In order to create and support this research framework, the researcher has reviewed various concepts, theories, and information such as technology acceptance model [3], trust concept and theory [4], consumer behavior theory [5], service management and marketing concept [6], business to customer framework as well as all important information about the casualty insurance business and industry.

**V. RESEARCH METHODOLOGY**

**A. Methodology**

This is a survey research on consumer’s behavior on buying online car casualty insurance. Research data came from both primary and secondary sources.

**B. Population and Samples**

The study population included all the customers of the car casualty insurance companies in Thailand which were uncountable. Thus, from the formula [7]

$$n = \frac{P(1-P)Z^2}{d^2} \tag{1}$$

According to the formula, the samples were 385respondents (Level of confidence = 95%). However, for safety reason, four hundred respondents were conducted in this study. Questionnaires were distributed to respondents who lived in four different regions which were north, east, west, and south. After that, non-probability sampling was done using the convenience technique

**Creating Research Tool**

The research tool was created in the form of questionnaires, and it was divided into five parts.

Part 1: The demographic information of respondents

Part 2: The technology acceptance model, adapted from a theory by David [3]

Part 3: Customer’s trust, adapted from McKnight and Chervany’s trust concept [4]

Part 4: Consumer’s behavior on buying online car casualty insurance, adapted from Kotler and Keller’s theory of marketing [5].

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Part 5: Respondents' comments on buying online car casualty insurance.

Questions in part one were arranged in an nominal scale, asking generally demographic information of respondents such as sex, age, marital status, education, types of work, and salary while questions in part two, three, and four were arranged in an ordinal scale with five levels of rating scale: very high, high, neutral, low, and very low.

Scoring criteria of respondents' technological acceptance and trust are as follows:

Average score 4.21 - 5.00 means Very high

Average score 3.41 - 4.20 means High

Average score 2.61 - 3.40 means Neutral

Average score 1.81 - 2.60 means Low

Average score 1.00 - 1.80 means Very low

However, questions in part four are checklist type which are consisted of both nominal and ordinal scale.

Questionnaires were handed out to 5 specialists to verify the content validity by identifying the Index of Item Objective Congruence (IOC) by choosing questions with an index of higher than 0.50 [8]. In relation to the reliability of the research tool, a reliability analysis was done by determining Cronbach Alpha which equal to 0.812.

### VI. DATA ANALYSIS

All data were analyzed by both descriptive statistics and inferential statistics. In particular, descriptive statistics is a method used for general analysis on respondents, i.e. percentage, measures of central tendency such as mean, measures of dispersion such as standard deviation while chi square was conducted as inferential statistics in order to investigate the different between the technological acceptance, trust, and the consumers' behavior on buying online car casualty insurance.

### VII. CONCLUSION

According to demographic information, the findings revealed that the majority of respondents were female (57.5 percent), aged between 25-35 years old (55 percent), single (65 percent), holding bachelor's degrees (67.5 percent), working for private companies (39.5 percent), earning approximately 20,001-30,000 baht per month (39.5 percent), and having experience on buying online car casualty insurance for about 1-3 years (44.75 percent).

In relation to the customer's technological acceptance, it was found that in terms of the acceptance of benefits, the acceptance hit a high level ( $x = 3.65$ ). To illustrate the point, the respondents claimed that 1) buying the online insurance helped reducing the difficulty of making an appointment with insurance representatives ( $x = 3.74$ ) 2) they did not feel uncomfortable to reject buying the insurance ( $x = 3.70$ ), and 3) they could get insurance policies faster ( $x = 3.52$ ). Moreover, according to the acceptance of the ease of use, the results showed that every acceptant level hit a high level (3.78). The first reason behind was that respondents could buy the insurance any time ( $x = 3.74$ ). Secondly, most of insurance companies provided very common policies for customers and they were easy to be understood and to be bought by customers ( $x = 3.79$ ), and thirdly, it was easy and convenient for them to buy insurances without any help from others ( $x = 3.72$ ).

In relation to customer's trust on car insurance companies, it would found that customer's trust hit a high level. They relied on websites of the companies ( $x = 3.83$ ). There were no mistake of policies ( $x = 3.72$ ), and online car casualty insurances were reliable ( $x = 3.72$ ).

Furthermore, according to the consumer's behavior on buying the car casualty insurance, the results revealed that the majority of respondents paid a lot of attention on speed of buying process (52.25 percent). Most of them decided to buy full coverage car casualty insurance (67 percent) during the fourth quarter of each year (40 percent). Normally, respondents preferred to do the online transaction during 12.00 - 5.59 pm (56 percent). Family members were quoted as influenced people. In relation to the payment, most of respondents used debit card as a payment method (29.5 percent). They normally received information about car insurance from television (27.38 percent).

#### A. Hypothesis Testing Results

**TABLE I**  
**RESULTS FROM CHI SQUARE TESTING DIFFERENCES BETWEEN CUSTOMER'S TECHNOLOGICAL ACCEPTANCE IN TERMS OF THE ACCEPTANCE OF BENEFITS AND CONSUMER'S BEHAVIOR ON BUYING ONLINE CAR INSURANCE.**

Customer's technological acceptance in terms of the acceptance of benefits	Chi-Square	df	p-value
Consumer's behavior			
Reasons of buying online car insurance	22.890	12	.001*
Period of buying online car insurance	19.387	12	.006*

From the Table I, the results showed that there were significant differences between customer's technological acceptance in terms of the acceptance of benefits and consumer's behavior in terms of reasons of buying and period of buying car insurance at 0.05 level of significance.

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TABLE II

TABLE 2: RESULTS FROM CHI SQUARE TESTING DIFFERENCES BETWEEN CUSTOMER'S TECHNOLOGICAL ACCEPTANCE IN TERMS OF THE EASE OF USE AND CONSUMER'S BEHAVIOR ON BUYING ONLINE CAR INSURANCE.

Customer's technological acceptance in terms of the ease of use	Chi-Square	df	p-value
Consumer's behavior			
Reasons of buying online car insurance	15.433	12	.002*
Period of buying online car insurance	20.014	12	.000*

From the Table II, the results showed that there were significant differences between customer's technological acceptance in terms of the ease of use and consumer's behavior in terms of reasons of buying and period of buying car insurance at 0.05 level of significance.

TABLE III

RESULTS FROM CHI SQUARE TESTING DIFFERENCES BETWEEN CUSTOMER'S TRUST AND CONSUMER'S BEHAVIOR ON BUYING ONLINE CAR INSURANCE

Customer's trust	Chi-Square	df	p-value
Consumer's behavior			
Reasons of buying online car insurance	30.123	9	.000*
Period of buying online car insurance	28.014	9	.000*

From the Table III, the results showed that there were significant differences between customer's trust and the consumer's behavior in terms of reasons of buying and period of buying car insurance at 0.05 level of significance.

### VIII. DISCUSSION

From the hypothesis testing results, it was found that there were significant differences between customer's technological acceptance and consumer's behavior, and this was in line with the study of Wang, Wang, Lin, & Tang [9] who studied the consumer's behavior on online banking, and the study of Kamarulzaman [10] who studied the e Commerce of travel services in United Kingdom, as well as in line with Amin [11] who researched about using credit card on mobile phone. The results showed that technological acceptance model played an important role in terms of influencing consumer's behavior on buying decision. Moreover, the results were also related to the theory of technological acceptance model (TAM) of Davis [3] and Davis, Bagozzi, Warshaw [12] who contended that TAM would influence buying decision together with attitude of users on information technology. For instance, consumers who highly accepted benefits of the process, tended to have more trust on the system, and this led to their using frequency. In contrast, consumers who had low acceptance on the process, tended to ignore the online products or services.

In addition, the hypothesis testing results also revealed that there were significant differences between consumer's trust and consumer's behavior, and this result was in line with the study of McKnight, Choudhury and Kacmar [13] who said that trust has definitely influenced consumers' behavior on buying products or services. The research findings were also in line with Jarvenpaa, Tractinsky and Saarinen [14] who studied consumer's trust on e-Commerce shops. Their research results showed that there was a positive correlation between trust and buying intention. According to these research findings, it can be concluded that consumers' trust has directly influenced consumers' buying behavior; thus, customers who highly trusted the online system of insurance companies, tended to buy online insurance rather than customers who had low trust on the online system.

### IX. SUGGESTIONS FROM THIS RESEARCH

- 1) It was found that customers' technological acceptance has effected consumers' behavior, therefore, firms should stimulate their customer to aware and accept benefits and the ease of use of online buying process. Customer relationship management (CRM) strategy should be taken into consideration as a tool to create the technological acceptance of customers.
- 2) The findings showed that trust has impacted on consumer's behavior: thus, firms should create trust by ensuring them about online security system as well as trying to create customers' confidence on online buying.

### X. SUGGESTIONS FOR FUTURE RESEARCH

- 1) A qualitative study could help a research to explore in-depth consumer's behavior.
- 2) The conceptual framework of this research can be applied to different types of industries.

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## E-Government Usage in Turkey: An Analysis of the Social Security Institution

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**Abstract:** This paper investigates the general situation of e-government usage of the Turkey. The monthly reports of Social Security Institution E-Government Gateway of Turkey were published for the years of 2012, 2013 and 2014. In this paper, these data are used as an indicator of e-government usage of Turkey. Basic time series graphs are used in the analysis. The results show that there is no trend in the series. The series move mostly by changes in rules and regulations governing SSI after related news coverage on the media and this could be called as the "curiosity effect". At last, seasonality of the series was investigated and the seasonal graphs show that generally variables have the lowest level in June.

### I. INTRODUCTION

E-Government or electronic-government could be defined as using the Internet and the other information technology (IT) tools to provide governmental services electronically. It is also called digital-government. Probably the most important aspect of e-government services is its ease to reach information and services electronically without visiting the government offices. Moreover, it reduces costs of providing such services on the government's side and also reduces bureaucracy and increases transparency and trust.

49.1% of households in Turkey have access to internet according to the Household Information and Communication Technology (ICT) Usage Survey of April 2013. This rate was 47.7 % in March 2012. 35.7% of households that do not have access to the Internet claimed that they do not have need to use Internet [1].

Turkey ranks 21st in the world ranking on financial statements thanks to financial policies implemented in recent years, whereas it ranks 80th in the rate of e-government usage that indicates social capital in the world. In direct proportion to its rate of e-government usage, Turkey ranks 92nd in confidence index [2].

Turkey ranked 80th on United Nations E-Government Development Index in 2012 and even though its position has improved in 2 years and it only ranked 71st in 2014 [3]. [4] states that developing countries such as Turkey and China have to concentrate more on the efforts towards raising the awareness on e-government applications and to increase the extent of the services. [5] argues that the real outcome of e-government is to make public activities transparent and enable citizens to participate more actively and interactively in the country's administration.

The research on e-government activities, their design, effectiveness, and their effects of related parties are limited in Turkey as e-government is relatively a new concept. While most of studies interested in the effects of e-government services on users, [6] analyzed the issue of how public employees think about the e-government activities and to what extent they use them. [7] explains that there are different types of e-government models such as government-to-citizens, government-to-business, and government-to-government and while establishing an effective e-government system, it is important recognizing the differences among these models. After reviewing the developments on the topic of e-government in the world and in Turkey, [8] reports the main findings of their survey questioning the effect of education and gender among e-government users in Turkey.

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The efforts to build an e-government in Turkey started during the 1990s with the establishment of Information Society. The early efforts aimed at strengthening Information and Communication Technologies (ICT) capacities in Turkey. The main electronic service provided by government was providing simple information to the public via official web sites [9]. E-Turkey initiation was started in 2001 by the Prime Ministry's "Action Plan" circular of 2001/352. The idea behind this act was to create a more competitive, dynamic, and knowledge based economy in Turkey. This initiation failed due to economic and politic instability during 2001-2002 in Turkey. A new initiation was started on February 27th, 2003 entitled "E-Transformation Turkey Project". The Information Society Department was established in March 2003 under the control of current Ministry of Development. Finally, in order to gather all sorts of electronic government services under the same portal, it was decided to constitute an "E-Government Gateway" by the Council of Ministers decision dated 2006/103016 and started to operate at <https://www.turkiye.gov.tr> web address. As stated in [10], thousands of addresses could be accessed through e-government gateway since 2008 in Turkey. In 2013 the e-government gateway provided 638 public services of 80 government organizations.

In order to provide quality health services for all citizens a General Health Insurance program is targeted by the government in 2006 and after two years delay a new legislation put into law with the decree of 5510 on October 1st, 2008. All sorts of health insurance concerns are coordinated under the E-Government Gateway.

This study takes the case of e-services provided by the Republic of Turkey Social Security Institution as part of the E-Government Gateway. Another study [11] discusses the interactions between e-government and the position of e-government application in SSI and the benefits of these applications for the citizens and accountants.

Our aim is to analyze the use of e-government services by public using monthly data from SSI for the period of January 2012 to December 2014. We would like to determine how the use of these services has changed through time for the period, whether certain changes took place during this period or not.

## II. E-GOVERNMENT SERVICES OF SOCIAL SECURITY INSTITUTION OF TURKEY

The Social Security Institution (SSI) was established in 2006 with the objective of the realization of a social security system in Turkey. It is constituted by syndicating three social security institutions, which are Social Insurances Institution, Retirement Fund and Bağ-Kur (The Social Insurance Institution for Tradesmen and Craftsmen and Other Self-Employed People) under a single roof by Law No 5502 of 2006. Briefly duties of the SSI according to Article 3 of the Law No. 5502 are summarized as; implement the social security policies; inform natural and legal persons, follow up international developments, to collaborate with the European Union and International organizations.

There are various e-government applications available on the SSI web site, however; they are only available in Turkish. Moreover, statistics about e-government applications are available in e-book format titled "SSI E-Government Gateway Statistics" for the years of 2012, 2013 and 2014 on the SSI web page (<http://www.sgk.gov.tr>).

In this paper we use "SSI E-Government Gateway Statistics" for 2012, 2013, and 2014. The number of service applications provided on SSI web site was increased from 31 in 2012 to 42 applications in 2013 and 2014. In order to have a balanced time series data, we omitted the services which are not common to all three years and thus we obtained 26 variables. The 27<sup>th</sup> variable is the total number of transactions performed with these 26 applications. Table 1 shows the abbreviation of the variables and their definition.

TABLE I  
DEFINITION OF VARIABLES

Abbreviation	Definition	Abbreviation	Definition
AGBRP	4A Germany/Bulgaria Retirement Payments	BRPI	4B Retiree Pension Information
ACBA	4A Change of Bank and Address	BSI	4B Service Information
ARPC	4A Retiree Pension Cuts	BPR	4B Payment Record
ARPI	4A Retiree Pension Information	BRR	4B Registry Record
ARPAI	4A Retiree Payment Information	CCB	4C Change of Banks
ARR	4A Retirement Registration	COMSP	4C One Month Salary/Pension Preference
ASR	4A Service Record	CRPC	4C Retiree Pension Cuts
ADIRR	4A Determination of Insured Registry	CRPI	4C Retiree Pension Information
ABDP	4A/4B Disability Payments	CTRP	4C Tracking of Retirement Process
ABCDTI	4A/4B/4C Drug Use Time Inquiry	CROP	4C Record of Optional Payments
ABCEPFI	4A/4B/4C Examination Participation Fee	CRR	4C Registry Record
BCBA	4B Change of Bank and Address	TII	Treatment Information Inquiry
BGSI	4B Grade/Seniority Information	Total	Total
BSD	4B Status of Debt		

The variables listed on Table 1 are divided into three categories as 4A, 4B, and 4C. This classification is due to Article 4 of Law No 5510. The three categories that were covered by previous legislation: employees (4A), self-employed (4B) and civil servants (4C) [12].

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III. AN ANALYSIS OF ISI E-GOVERNMENT GATEWAY STATISTICS

There are total of 26 variables to work with in this data set and performing graphical analysis for ach variable separately would not be suitable for presentation purposes. Therefore, we gathered similar applications in the same group for presentation and analysis purposes.

Figure 1 has two panels and while the line graphs of the variables of ABCDTI, ABCEPFI, ABDP and ACBA are shown on the first panel on the left; the line graphs of the variables of ADIRR, ARPI, BSD, ARR, CROP, and BSI are shown on the second panel on the right.

The first observation on Figure 1 is that the use of applications was clearly high on the first month of 2012 and started to decline gradually for the following months for almost all of the variables representing various use of e-government applications. This situation could be called as the “curiosity effect” as using SSI web site became easier after December 2011. [13] informs public about a change in regulations related to use of SSI services provided on the web. At the beginning, people who have social security related inquiries had to use e-government gateway portal which required a password that could be obtained only at PTT centers for a small fee. This situation has changed and people are allowed to use SSI web site directly without any password after December 15, 2011.

About the first panel on the left, values of all variables (ABCDTI, ABCEPFI, ABDP, ACBA, and ADIRR) are approximately on the same interval of 100,000 to 400,000 uses for the period under analysis, however, there is a single peak for ACBA in the fourth month of 2013. This application is “Change of Address and Bank” for the users.

The panel on the right has two sub-groups where ARR, CROP and BSI values are measured on the left vertical axis and the values of ARPI and BSD are measured on the right vertical axis. These two-sub groups followed two different patterns for the whole period while variables in each sub-group moved together. ARR, CROP, and BSI started very high back in January 2012, declined gradually until the second quarter of 2013 and they stayed stable at low use values until the middle of 2014 and they started to increase again until the end of 2014. ARPI and BSD, on the other hand, showed more fluctuations but moved together. ARPI is retiree pension information and BSD is status of debt services. There is a sharp increase on the value of BRPI in the first month of 2013.

Similarly Figure 2 has two panels and while the line graphs of AGBRP, BCBA, BGSİ, CCB, COMSP and CRR variables are located in the first panel on the left, and the line graphs for variables of BRPI, BPR, BRR, CRPC,CTRP and TII variables are located in the second panel on the right.

AGBRP (Germany/Bulgaria Retirement Payments) is located on the first panel and it has the lowest values for the whole period. The highest frequency of AGBRP is about 2,000 while frequencies for other variables are about 200,000. Therefore, the values of AGBRP are measured separately on the right axis on the first panel. AGBRP application is only used by retirees of the system who worked out of Turkey and therefore it has remarkable low use as e-government application in the system. The trend of the six variables on the first panel is similar to the general trend on Figure 1; their values were very high in January 2012 and first declined gradually and later increased relatively again towards the end of 2014 with the exception of BCBA. BCAB shows increases around the second quarters of 2012, 2013, and 2014.

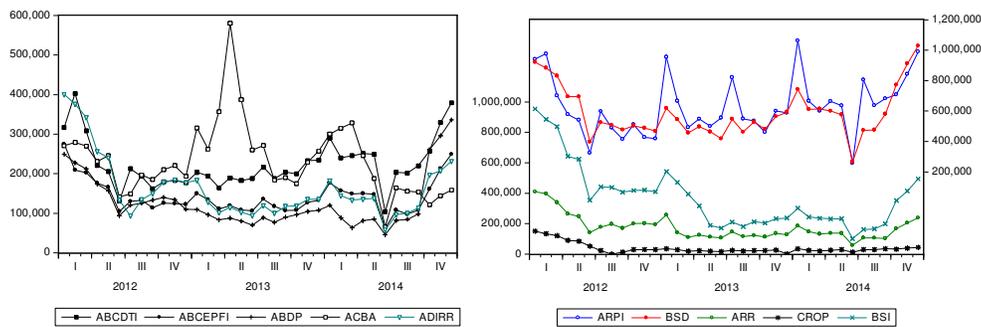


Figure 1. Graphs of ABCDTI, ABCEPFI, ABDP , ACBA, ADIRR, ARPI, BSD, ARR, CROP

The variables in the second panel are consisted of two groups. The first group consisted of BRR, CRPC, CTRP, and TII variables which are measured on the left axis of the right panel and their highest value is 280,000 uses. The second group consisted of BRPI and BRP variables which are measured on the right axis of the right panel and their values are around 500,000 uses a month. One important observation about the variables on the second panel is the sharp increase on the value of BRPI in the first month of 2013.

While values of ARPAl are presented on the right axis on panel 1, values of CRPI and ARPC are presented on the left axis in the first panel on the left. On the other hand, the values of ASR and TOTAL are presented in the second panel on the right.

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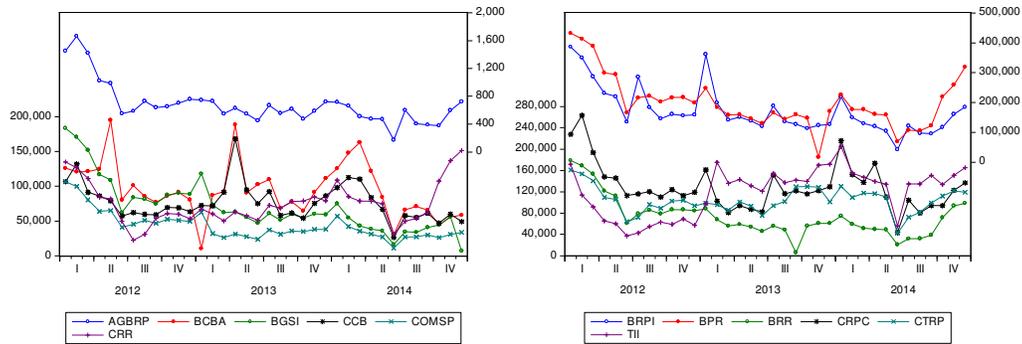


Figure 2. Graphs of AGBRP, BCBA, BGSİ, CCB, COMSP , CRR, BRPI, BPR, BRR, CRPC,CTRP, TII .

The values of ARPAI reach approximately to 1,200,000 and its graph is located on the left panel. On the other hand, the most frequently used application is ASR (Service Record) is drawn on the right panel and its values are on the left vertical axis. ASR values reach approximately to 5,000,000 . At the same time we can see that total numbers of service use values are in 3 million to 16 million ranges. It reaches 16 million in the first moth of 2014 also it has a peak in first month of 2013. ARPAI, CRPI and ARPC have the same peak dates with the TOTAL variable.

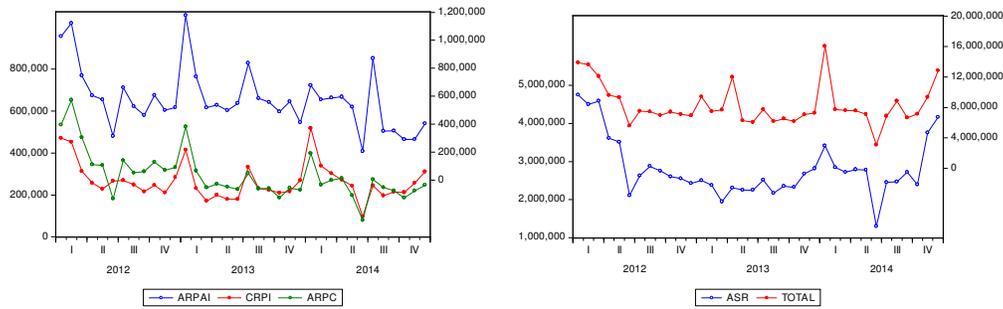


Figure 3. Graphs of ARPAI, CRPI, ARPC, ASR, TOTAL

The ARPI, BRPI, and CRPI values are presented on three different figures and all of them have a peak value in January 2013. A new law published in the Official Gazette dated March 1st, 2012 stating the monthly pension payments of people who retired before year 2000 [14]. Following this law, there were lots of news coverage on the media starting with January 2013 about the retiree pension adjustment which would take place in 2013 [15].

Figure 4 shows seasonal means of all the variables. It is clear from the seasonal graphs that there is seasonality in the series. Access to e-government gateway services look high at the beginning of each year and start to decline until June. The uses of services stay relatively low during the summer months and start to increase during the last quarter of each year. It is possible to argue that the decline in summer months is due to fact that summer months are considered as the main vacation period for the majority of Turkish population. As almost all schools are closed for these months, most of the workers prefer to use their vacation days during these months. Furthermore, the high use rates during the first month of each year is probably due to curiosity of the public using SSI about new rules and regulation and their possible effects on their pensions. Finally, the relatively high use of services at the end of each year could be about year-end check and control activities by individuals and/or firms for fiscal concerns.

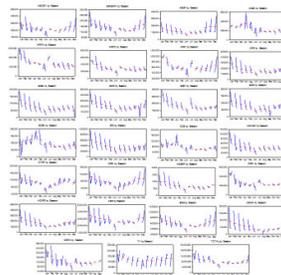


Figure 4. Seasonal Graphs of the all variables

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## IV. CONCLUSION

SSI E-Government Gateway statistics are used in this study for the period of 2012-2014. Time series characteristics of the series are investigated and evaluated.

At first, the peak values are determined and possible reasons behind them are investigated. It looks like that the news in the media about changes in regulations and adjustments to benefits is the main reason behind the change in the use rate of e-government services. Moreover, the use declines starting after January and reaches its lowest level in June and stays low during the summer months. This is probably because of summer months are used for vacation. It is expected to see an increase in use of e-government services through time since the use of Internet.

Furthermore, the use of Internet among Turkish households increased only a small percentage from 47.7% in 2012 to 49.1% in 2013 as mentioned above in introduction. Our study shows that while the use of SSI E-Government Gateway services fluctuated during the 3-year period, any increase in e-government service use could not be found.

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## Measuring the E-Business activities of SMEs in Yemen

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**Abstract:** This paper aims to measure the e-business adoption activities in Yemeni SMEs. The paper employed a mixed method (quantitative and qualitative) case approach. The results indicate that Yemeni SMEs are at the early stages of e-business adoption

### Introduction

Increasingly, in developed and developing countries, small and medium-sized enterprises (SMEs) are becoming more important to national economies due to their strategic significance in developing different industrial sectors Worldwide. Therefore, SMEs play a major role in an economy by significantly contributing to the enhancement of the countries' gross domestic product (GDP) and its labour force by creating more job opportunities and developing skilled labour.

However, Rapid development has been witnessed in the World within different aspects of life, especially the technological revolution such as e-business. This has become a feature of this era requiring us to 'keep-up' in our daily society, losing the traditional pattern of our daily lives and combining scientific methodology of an analytical and experimental nature. In the past few years the emergence of e-business and e-commerce in the World has been carefully surveyed. For instance, there is widespread use of the internet in every aspect and phase of business.

This article's main aim is to measure the actual and potential e-business activity of SMEs in Yemen. The research aims to answer the question: To what extent are SMEs engaging in e-business?

### Literature Review

#### SME Definition

The definition of a Small and Medium Enterprise (SME) varies from country to country. To define whether a company is an SME, there is a need to understand the number of employees, the annual turnover and the balance sheet of the company. In European law the Medium-Sized Enterprise is defined as a firm having employees between (50 and 249), and an annual turnover less or equal to 50 million Euros. A Small-Sized enterprise is a firm with employees between (10 and 49), and annual turnover less or equal to 10 million Euros (EC, 2005). Whereas, the Yemen Government defines SMEs as: a Medium-Sized Enterprise is a firm having employees between 10 and 50 and Small-Sized enterprise is a firm with employees between four and nine (YMIT, 2014) (See Table1).

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Table 1 SME Definition

Enterprises	European	Yemen
Medium-Sized	50-249	10-50
Small	10-49	4-9
Micro	1-9	1-3

### SMEs in Yemen

The YMIT (2014) state the number of SMEs in Yemen at about 27,796 companies in the manufacturing field ( see Table 2).

Table 2 Number of SMEs

		Percentages
Enterprise	Large	0.51
	Medium	1.91
	Small	19.15
	Micro	78.43
Location	Sana'a	18.06
	Taiz	13.93
	Rest of the cities	68.01
Type of Enterprises	Food products and beverage	43.75
	Fabricated metal products	14.78
	Non-metallic mineral products	11.02
	Apparel products	10.80
	Other (services, retail)	19.65

### E-business and E-commerce

Most researchers state that e-business and e-commerce are similar in terms of selling and buying products on the internet and others define e-business and e-commerce as distinct. For example Chaffey (2011) argues that e-commerce is a subset of e-business. Also, IBM defined e-business back in 1997 as *"the transformation of key business processes through the use of internet technologies"* (Chaffey, 2011). Parazoglou (2006) and Turban (2010) argue that e-business is more than buying and selling products and services, it is all about customer services, collaborating with business suppliers and partners as well as making transactions electronically inside the organisation.

Turban (2010) defines e-commerce as an external activity of buying and selling products and services online. While Parazoglou (2006) defines e-business as the integration of internal and external organisational processes and the connection between the organisation and their suppliers and partners as well as customer scarification. However, Fillis et al. (2004) state e-business as companies that employ ICT in their business operations, but exclude sending and receiving text-based e-mail messages.

### SMEs and e-Business

Nowadays, the worldwide economy is developing and e-business has increased and become an important component of business strategy and economic development. The integration of information and communications technology (ICT) has an effect within the organisation and individual. In addition, ICT has a strong effect on businesses with improved productivity, an increase in the number of customers and has reduced the cost of products (Andam et al., 2003). However, one of the most important strategies that can effectively help SMEs to enhance their business performance is the utilisation of information and communication technology (ICT) (Sin Tan et al., 2009). Moreover, ICT can provide SMEs with several competitive advantages such as integrating supply chain partners, organizational functions and offering critical information at the right time (Sharma and Sheth, 2004).

However, the characteristics of SMEs, such as structure, resource constraints and size, generate several challenges and difficulties towards the adoption of ICT. According to MacGregor and Vrazalic (2005), despite the rapid growth of ICT within SMEs, the level of ICT adoption by small and medium enterprises remained comparatively low. The lack of financial resources required for ICT development and maintenance is one of the main reasons preventing SMEs from adopting ICT (Parida et al., 2010). According to Ghobakhloo et al. (2012), small enterprises have less tolerance in accepting cost and risk associated with adopting new technologies.

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Furthermore, the lack of ICT literacy among the owners and employees is another barrier that inhibits effective ICT deployment within SMEs (Mehrtens et al., 2001).

### E-business Measurement Evolution model

This research contributes to the existing literature in e-business adoption by outlining the factors involved with e-business adoption in SMEs in developing countries and Yemen. Also, by testing the e-business Measurement Evolution model on Yemeni SMEs. This study does this by developing a specific e-business Measurement Evolution model based on the contribution of existing literature and the e-adoption ladder model. This is because organisations may differ in their level of e-business adoption, varying from the very simple use of emails to a more complex collaborative platform used to deliver services to employees, partners and customers.

The E-business Measurement Evolution model consists of nine stages which can help SMEs to understand the level of e-business in their firm. Stage zero means the business does not have internet access. Stage one (Emails) means the business does not have a website but accesses information and services on the internet and uses email for communications. Stage two (Social Media) means the business has pages on social networks such as Facebook and uses these pages to advertise their products and services as well as to include information about the business and contact details. Stage three (Websites) means the business has its own websites which only include very basic information about the business; relies on customers initialising contact for further information.

Stage four (E-commerce) means customers can access more detailed information about products/services and customers can buy and pay for products/services from the website, but the website is not linked to internal systems and orders are processed manually. Stage five (Mobile Apps) means the business has developed mobile apps which include their product and services and the consumer is able to purchase goods and services through the app. The mobile app is linked to internal systems and orders are processed automatically.

Stage six (Cloud Service) means the business uses cloud services to store their files, software and applications services. The business will be able to access the applications and services across a range of devices and networks from anywhere. Stage seven (E-business) means the on-line “store” is integrated with other business systems, e.g. order processing, fulfilment, accounts and/or marketing. Stage eight (Transformed Organisation) means internet technology drives the business internally and externally, and is used to manage all processes end-to-end more effectively and efficiently (see figure 1).

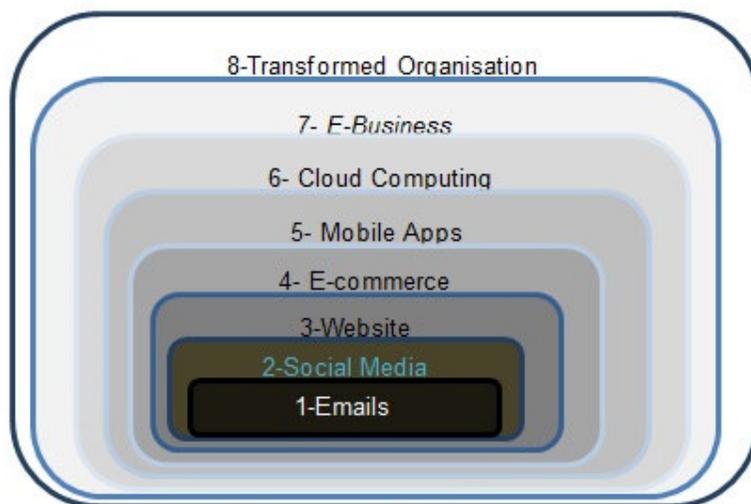


Figure 1 E-business Measurement Evolution Model

### Research Methodology

The aim of this study is to measure the e-business activities of SMEs in Yemen. To achieve this, the current study will employ a mixed method case approach. The study will integrate different methods in order to facilitate a deep understanding of the adoption level of e-business in SMEs in Yemen. Following a sequential exploratory design (Creswell, 2003), this study will comprise two stages and employ a total of two different data collections that include: semi-structured-interviews and survey questionnaires. In exploratory design, qualitative data has the priority over quantitative ones (Johnson and Onwuegbuzie, 2004).

In the first stage, a series of semi-structured interviews will be conducted with SMEs' managers in order to further explore their understanding of E-business in their enterprises. The results of the first stage will help in informing the design of the questionnaire. The second stage, a survey questionnaire will be used to generalise and verify the findings from stage one to the SMEs' population. The SMEs' survey characteristics include - size: 1-50 employees, location: Taiz and Sana'a in Yemen and business

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activities: retailer, wholesale, manufacturing, other services. The sampling frame consisted of 600 firms. SME is a firm that employs not more than 50 employees. A total of four interviews were conducted with owners and managers. A total of 100 questionnaires were distributed randomly to about 100 managers and decision makers in SMEs in Yemen and the return was 51 questionnaires.

**Findings**

Most of the interviews stated that they have basic ICT infrastructure such as computers and internet, and just a few have a website. This can be attributed to the fact that most of the SMEs’ owners, managers and decision makers, described their understanding of e-business as an important technology for SMEs to grow, they stated that e-business is the main aspect for selling and buying over the internet as well as the product’s advertisement . Also they mentioned that e-business becomes a new way to extend their business and reach the whole world quickly. When they were asked why they have not yet adopted e-business, they mentioned a lot of barriers such as government and bank support, the weak ICT infrastructure, electricity and electronic payments as well as legal aspects and the regulation of e-business. They added that there was a lack of experts, skilled employers and other barriers.

About 80 percent of the respondents were males and 20 percent females, and most of the respondents were 70 percent in the business services field and 30 percent in wholesale and retail. Businesses with between 1-3 employees were 20 percent, 4-9 40 percent and 10-49 40 percent, see Table 3.

Table 3 ICT infrastructure results

Infrastructure	Yes		No	
	Frequency	Percent	Frequency	Percent
Networked Computers	40	78.4	11	21.6
Websites	40	78.4	11	21.6
Broadband Connection	29	56.9	22	43.1
Internet Connection	45	88.2	6	11.8

The analysis of the questionnaires considers the current state of e-business adoption in Yemen SMEs via the e-business measurement evolution model as explained in figure 2, 50 percent of the SMEs are on the “not started” stage while 57 percent at the “email stage” and they use the emails for communicating with their suppliers and customers. However, 78 percent of the businesses that participated in this study have social media and used advertising for their goods and services. An interesting score was that most of the SMEs have their own website and only 39 percent use e-commerce for purposes such as to receive orders and processed them manually and receive the payment either by bank transfer or cash. On the other hand, none of the respondents have any experience of using mobile apps, cloud computing, e-business and transferred organisation.

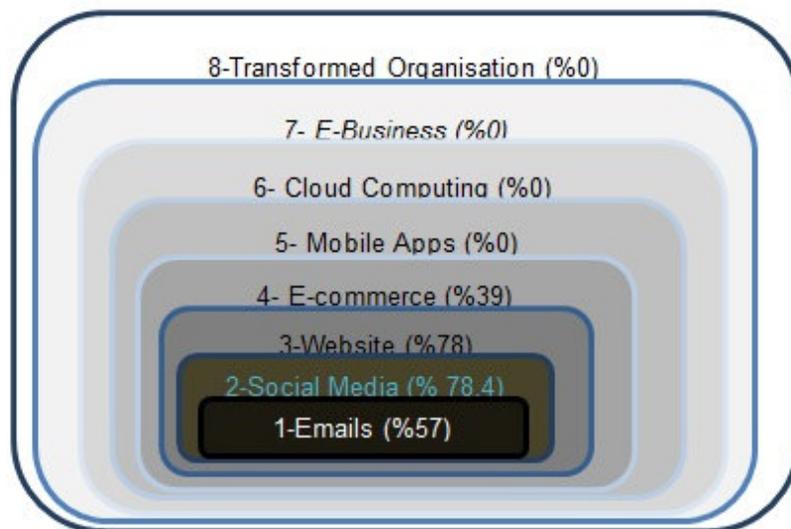


Figure 2 E-business Measurement Evolution Model

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## Discussion

The conducted study concludes that most of the SMEs have a basic ICT infrastructure such as computer networked internet connections. This can be attributed to the fact that most of the SMEs' owners, managers and decision makers, describe their understanding of e-business as an important technology for SMEs to grow. Also they mentioned that e-business is the main aspect for selling and buying over the internet as well as product advertisement.

The findings stated that internet connections, emails and websites were the main technologies adopted by the SMEs as those technologies were used for electronic advertising and providing firm information. For instance, emails were used for communicating with suppliers and customers, and websites were used for some kind of e-commerce purpose such as to receive orders and process them manually and receive the payments either by bank transfer or cash. Referring to the e-business measurement evolution model SMEs are still at early stages of e-business adoption and these stages are the important basis of the adoption of e-business and it shows SMEs are able to move toward the stages to adopt e-business. These results agree with the findings of Mendo and Fitzgerald (2005) that early stages of electronic business adoption are usually considered by connecting to the internet then the use of relative technologies such as email and websites.

The highest percentage of the SMEs are those that used social media for electronic advertising, selling products and providing firm's information, another major service being websites that were adopted with a small use of e-commerce. Only 20 SMEs enabled customers to purchase through either the company's social media or website. The result confirms the Almotamar (2014) report that the Yemen e-commerce sector is witnessing rapid growth and has exceeded expectations, and has become a new way of shopping compared with previous years. In the last year, the first electronic store website was established called Warzan and became arguably the best e-commerce site in the scope of e-commerce in Yemen. Although there are many individuals using Facebook pages to promote their products, those pages do not have sufficient confidence due to not being considered an entity and not officially registered compared to the Warzan company which is a registered company and has earned the confidence of consumer rights.

## Conclusion

E-business has provided many benefits to developing countries. It has reduced the cost of all sales transactions and increased international trade which may result in economic development. The Yemen e-commerce sector is witnessing rapid growth with exceeded expectations, and has become a new way of shopping compared with previous years. This paper's main aim was to measure e-business adoption activities in Yemeni SMEs.

This paper employed a mixed method (quantitative and qualitative) case approach. The paper integrated different methods in order to facilitate a deep understanding of the adoption level of e-business in SMEs. Firstly, semi-structured interviews were conducted with SMEs' managers. Secondly, a survey questionnaire was used to generalise and verify the findings from stage one to the SMEs' population.

The findings of this study have identified the current state of e-business adoption in Yemen SMEs via the e-business measurement evolution model, 50 percent of the SMEs are on the "not started" stage while 57 percent at the "email stage" and they use the emails for communicating with their suppliers and customers. However, 78 percent of the businesses that participated in this study have social media and used this for advertising their goods and services. An interesting score was that most of the SMEs have their own website and only 39 percent use e-commerce for purposes such as to receive orders and processed them manually and receive payment either by bank transfer or cash. On the other hand, none of the respondents have any use or experience of mobile apps, cloud computing, e-business and transferred organisation.

Based on the research findings, the research offers the following recommendation: the owners and decision makers need to understand the benefits that their company can gain from adopting e-business as well as the growth of their business. Also, owners must be aware of the technology and they have to keep up-to-date with the revolution of technology. Decision makers should employ ICT experts to help the company to identify the need for development to move the company toward the adoption of e-business. For instance, the e-business environment and infrastructure must be continuously improved to facilitate e-business applications in SMEs including high speed internet, a full functionality website, secure order processing and payment systems. SME employees need to be trained to use such technology.

Further research will investigate the barriers and drivers that deter SMEs from adopting e-business as well as to increase the study sample. This will enable identification of the unique requirements and problems related to SMEs in adopting e-business.

### Limitation of the study

It should be noted that this research has a limitation. The sample of this study was small due to the distance between the researcher location and the sample of the study. Therefore, the study sample has to be increased in further research.

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## eGovernance mechanism with BioMetrics Classification and Authentication for Digital VISA Issuance and Validation

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**Abstract:** The incorporation of the Bio-metric authentication system with the identification of Fingerprint pattern is an upcoming eGovernance Mechanism for Visa is an information validation and Visa processing mechanism using an IT and Communication infrastructure. Issuance of VISA by the consular and embassy is among the top 100 risky jobs. This has a very serious impact on the relationship between countries and among the standard forum of United Nations. The complex process need adequate data input from various sources. The integration of those data is the core value of this paper which needs the global impact for successful implementation. The statistical analyses of UN reports say that there are huge quanta of people who overstay or attempt VISA Run. This could create adverse effects in a nation's economy and security policies. However, this crisis can be averted through digitization and eGov mechanism in Visa Issuance, this feat can be achieved through the means of Global data and information verification process associated with multilingual data validation system. EU has already adopted VIS a form cross continental information interchange process during their Schengen Visa issuance.

**Key words used:** VISA Issue, Biometrics, FingerPrint, VISA Verification, Travel History.

### INTRODUCTION

Cross nation travel has been enabled to its utmost ease and secure form, by means of a independent nation governed booklet, 'The Passport'. The progress of this mechanism is so rapid that the feasibility of next to nill preplanning is enormous. Still the process holds a large scale adverse effect subsequent only to its progress, the possibility of many immigrants to overstay their acknowledged duration using reasons both actual and faux.

Studies show illegal residents are more prone to be involved in criminal activities in their host nation. The task of reviewing and verifying the civil/crimnal offenses by embassy and consular (VISA) is tough and follows a extremely time consuming process. Other reasons like Tax evasion and customer duty leniency in host nation causes, huge financial impacts in the parent nation, this paper describes connecting the Passport Control and Legal System with Global VISA processing to avoid issuance of VISA for Criminal and Legal imposters.

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## RELATED WORKS

For decades the VISA Issuance Process was kept confidential and was a proved complication for many cross nation travelers especially tourists with inconsequential travel agenda. But the present environment has created a structure that travelling across the borders has certain acknowledged liberation. The United Nations Migration council in 1982 declared the Justice for the Alien and the adequacy of the consular establishment enabling the VISA System.

The United Nations Migration Council has declared the Restrictive Employment immigration policies which clearly quote the effectiveness and implications of sending people from ASEAN Countries. According to the statistics released by the United Nations in 2010, it quotes that 13% of the people who travel in Tourist VISA to other countries fail to return back to their nation post their validity of VISA. And 6% of the total people who travel in Tourist VISA with criminal backgrounds departing from their home country to evade the law. Data from which an estimation of the policies is made in this paper consists primarily of government or scholarly publications that appear occasionally, and newspaper reports compiled by various institutions. Three main sources have been used. The first one is a compilation of news items by the Center for Immigration Studies (CIS) in Washington, D.C. sent on a weekly basis to interested recipients. The second is a monthly newsletter published by the University of California at Davis. The third is a bi-monthly newsletter from the Scalabrini Migration Center in the Philippines on Asian Migration News (AMN).

Globally most nations have already digitized their civilian records, in an highly secured environment integration of these data is feasible countries with high population and a high global migration like India and China have their own respective digital civilian record keeping.

### India's big biometric database

India houses the most ambitious biometrics database in the world, **Aadhaar**, which has so far gathered fingerprints, iris scans and photos of more than 500 million citizens – many of whom had no prior proof of their identity. Each gets a 12-digit number used for various services.

### China to get facial payments technology

China will see the introduction of an app using facial recognition to authorize payments, meaning that people's features will become their PIN for purchases. Once installed and linked to a credit card or bank account, the app will authorize payments in as little as one second.

Obtaining a suitable environment and integrate these digital information can further take Visa Issuance to next level having minimal manual interaction to the system, thereby minimizing the possibility of human error

The most used biometric method for data is Finger print verification,

Fingerprints - A fingerprint looks at the patterns found on a fingertip. There are a variety of approaches to fingerprint verification, such as traditional police method, using pattern-matching devices, and things like moire fringe patterns and ultrasonic.

## EXISTING SYSTEM

The European Union has the VIS Program which enables to share almost 97% of the data among the European Countries to avoid VISA Fraud and VISA Trading. The Visa Information System (VIS) started operating on 11 October 2011. It connects consulates in non-EU countries and all external border crossing points of Schengen States with a central database. VIS processes data related to applications for short-stay visas in the Schengen Area. Visa applicants will enjoy faster procedures thanks to the use of biometrics, which will also facilitate the identification of visa holders. Now, VIS is being used for all Schengen state visas.

Very similarly we have APC (Automated Passport Control) mechanism in the US Passport Control section. This is an initiative by the CBP Team which stands responsible for Customs and Border Protection. This APC has the ability to handle International Visitors and expedite the eligibility of Visa Free Entrance and Verification Checks. The usage of APC gives the visitors a faster processing, low congestion and shortest processing time. This APC not only speeds the processing, but also saves the environment by skipping the Customs Declaration forms and Arrival Card / Departure cards. Travelers may be prompted to scan their passport, smile for a photograph and scan the barcode of their flight boarding pass. Need to validate the information displayed in the screen before moving ahead. This simplifies the process around the manual grounds of checking information by the Passport Control Officer.

## VIS WORKING PROCESS

The VIS allows the states of Schengen to share the information and particulars about an individual among the other states. The VIS uses a centralized IT and communication infrastructure to get connected with other states across the Schengen countries and consulates in

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non-EU countries specifically the border crossing points across the Schengen. The system basically uses the Fingerprint identification system to identify and match the records. These facilities in easiest identification of the rightful holder of the VISA; and accurate validation of the information provided by the holder. This fights against the VISA Abuses and VISA Trading. And, this protects the travelers enhancing the security.

The competent authorities at the Border Control and other agencies may consult with the VIS for purpose of examining the applications and issuing the VISA or entry into the state. The authorities responsible for carrying out checks at external borders and within the national territories have access to search the VIS for the purpose of verifying the identity of the person, the authenticity of the visa or whether the person meets the requirements for entering, staying in or residing within the national territories.

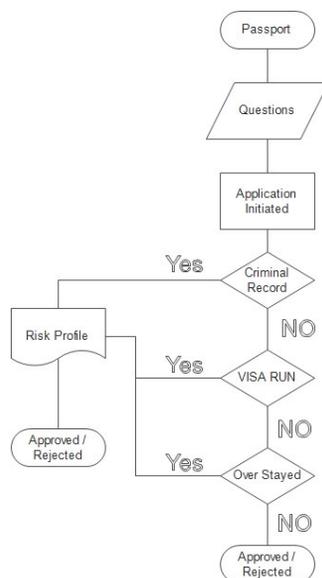
Asylum authorities only have access to search the VIS for the purpose of determining the EU State responsible for the examination of an asylum application. In specific cases, national authorities and Europol may request access to data entered into the VIS for the purposes of preventing, detecting and investigating terrorist and criminal offences.

### PROPOSED SYSTEM

When the EU is able to club the VIS enabling the quicker issuance of VISA validating all the synchronized information, why not the other countries is going to the right question of the hour. The system is all about creating the IT infrastructure and communication infrastructure capable of verifying the information globally amongst all the countries with the ability of multilingual information validation process. Considering global digitization, with an effectual system, the percentage illegal immigrants can be reduced, by tapping civilian's other data than those available through passport, this can be achieved through global biometrics data integration.

The applicant may be asked to input few mandate information like the option of choosing the country for his/her studies or employment or tourist visit. Basic inking about the country and his financial positions could be given with high weightage. For tourist VISA considering the weightage and risk factors the system needs to be designed such that it offers, 15 days valid VISA, 30 days valid VISA, 90 days valid VISA and Airline Ticket based VISA and more in the line flexible enough understanding the risk ability of the destination country.

At the macro level it is similar to the existing system it validates the validity and genuineness of the Passport and other supporting documents including Financial Reports, social ties, economic ties and other ties in line with the policy of the destination country.



Flow Chart : 1 Process of Decision Making

### IN DETAIL

The complex process by each and every embassy is that to check that applicant has been convicted or found guilty of any civil or criminal activities. The secondary question comes before issuing the VISA would be to check if the applicant has ever overstayed or violated / breached the decorum of any country over his travel period. And finally the last question would be his ability to cover the

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expenses during his travel based on his or her financial positions. Further after receiving the satisfactory responses for all the above questions a VISA is either granted or rejected.

### IMPLEMENTATION TRIAL

The implementation part is underway and the following pictorial moves gives the basic idea about what the system is all about. Figure 1 gives the information for the login process controlled by secure authentication system.

Figure 1- Login System

Post login the embassy or the consul or VISA Officer will key in the passport number and country of issuance. On the validation of information, the travel history of the applicant will be visible into the asylum's screen to make the decision quicker and better. The decision panel application will be HTML5 application which fetches the data records easily over mobile and tablets.

### Bio metrics governed Visa consideration system

➤ Finger Print Verification:

The finger print when recognized, taps the integrated database and the file of the corresponding civilian provided by the particular country is loaded to the system, this file displays civilians, civil, judiciary, financial and criminal records. Based on the relevant information, a graph for civilian Visa consideration is determined along with a score (Visa Consideration Score), VSC, pertaining to the VSC system delivers the recommendations for the Visa, for a score below consideration point the system provides a consideration blocker and it's in-turn sent to Administrator for approval.

The administrator (Entry clearance officer) can verify the nature of the blocker, its severity and its potential impact to the particular nation, each nation has its own nature of Financial, Civil or Judicial upkeep inadequacy for VISA, whilst considering all factors the administrator clear's/endorse the block for further Visa issuance proposal.

This is then followed by Digital Visa Issuing process.

### Digital VISA Issuing System

Figure 2 - Passport Verification Login

When the passport information is inputted, the details pertaining to the issuing country will be displayed. This uses the ISO code of country representation. The first two letter code represents the Country in which the passport was issued. The last character of the digital passport is the Check Sum value of the passport holder.

The decision panel displays the particulars of the passport which is connected with the Judicial System of the country which the passport is associated with. The below screenshot gives the decision panel of the VISA Issuance System which defines the probability of the best issuance with Frequency of the Travel and Criminal cases associated with him. The age defines the recently passed age as per the passport. Criminal Records are fetched from the Judicial System of the Government Database. The frequency is based on the stamp-in and stamp-out of applicant at the airports and border check-points. It calculates all the travel and defines a point based system to define the Over Stays, Criminal Activity in which applicant has involved in other countries and so on. These factors are internally managed and travel remarks are updated. The system then generates its decision over the application. Of-course, there is no mandate for the consul or VISA Officer to act according to the system, with the decision abilities of the self, he or she can have the decision. Some complex cases like way long back the criminal records might have existed, the RIGHT TO BE FORGOTTEN rule can also be implemented.

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Embassy of Tunisia

New Delhi Processing Center

## Decision Panel

Passport Number	IN865592799584837W	Name	Kokula Krishna Hari K
Age	24 (Twenty Four)	Criminal Records	NIL
Travel History	Frequent Traveller - 2/month	Travel Remarks	ON-TIME Returns
System Decision	ACCEPT & ISSUE	Citizenship	DUAL

## Detailed Travel History

Sl. No.	Type	Country	VISA #	Valid From	Valid Until	Extension	Criminal / Over Stay
01	TOURIST	MALAYSIA	Q758856	02-JAN-2014	01-JAN-2015	NO	NO
02	BUSINESS	UNITED KINGDOM	A3774593	10-JUN-2014	09-DEC-2014	NO	NO
03	H1B	UNITED STATES	I27336444	10-FEB-2015	09-FEB-2021	NO	NO
04	TOURIST	THAILAND	T449993	28-MAR-2015	27-SEP-2015	NO	NO

[Load More Previous Records](#)

Figure 3 - Application Decision Panel with Travel History

The decision panel also has the ability to display the detailed travel history and detailed criminal activity of the applicant. The above image displays the last 4 travel VISA issued to the applicant. The VO can even expand this list. If the case, the applicant would have had some criminal records or passport revoking under the laws, the same will also be displayed here.

### CHALLENGES

The implementation phase of this Integrated Mechanism would be a great challenge mainly because of synchronization of data among various governmental agencies and governments. Every Agency and Government is highly considering the value of data and privacy of each and every citizen of their fellow country. This is the major and only flaw in all the phases of this Integrated eGov mechanism for Remote VISA Issuance by the Embassy and Consular article.

### FUTURE WORK

The process of integration doesn't have a limitation. The next process would be integrating the Polis Records including petty offenses and other civil disputes. The algorithm would be strengthened to explore the vitality of the petty offenses and civil disputes while making a final decision over the issuance of VISA. Additionally, the financial monitoring would also be incorporated through the service banks in each and every country which could be eradication of Lodgment of Money into the accounts at the last moment. As of now the final module which needs to be appended amongst the others quoted above is the tax payer system.

### CONCLUSION

In the closing remarks, the implementation of this integrated eGovernance mechanism will surely help in limiting the total number of expatriate illegally overstaying and attempting to perform the VISA RUN. Thus helping to maintain the country's deliverability and other opportunities for the legal citizens, globally in all the countries. This could also foster the relationship among the countries.

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## Culturally Sensitive Customization of the Coloristic Component in Websites

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**Abstract:** My study focused on website localization for online shopping, which has high economic potential in accelerating electronic commerce. I compare Russia, Finland and Germany to study how different cultural features affect the graphical user interface. In my thesis [13], five cultural models were analyzed in order to find the cultural dimensions that have the biggest influence on the user interface of websites, with outcome of 15 cultural dimensions: those by Hofstede [5], Hall [3], Lewis [8], Trompenaars [15] and the LESCANT model by Victor [16]. The online shopping websites were next analyzed to find the elements where there might be cultural interpretations, and total of 31 website elements were identified. The WebSCA (WebSite Cultural Adaptation) framework was then formulated as a table combining the cultural dimensions with website elements. The WebSCA framework was then used in an empirical study in Russia, Finland, and Germany to determine the validity of this framework and the cultural assumptions raised by the cultural models. In this article, I focus on perception of colors, as colors appear to have a strong influence on perception of information.

**Keywords:** culturally sensitive websites, localization, customization, culture, cultural typology, cultural model, LESCANT, colors perception, website, GUI, graphical user interface, framework

### I. INTRODUCTION

Localization involves making a product linguistically and culturally appropriate to the target country or region and language where it will be marketed and sold (according to Localization Industry Standards Association as cited by [2]). Reference [5] defines a culture as “the collective mental programming of the human mind which distinguishes one group of people from another.” To analyze these programming patterns many cultural models have been built [6]. They compare the similarities and differences using cultural dimensions, which Hofstede also calls international variables [6]. According to [5], a cultural dimension is an aspect of culture that can be measured and compared with corresponding indicators of other cultures. Different dimensions are used in different models of culture. They depend on the theoretical basis chosen for comparison and analysis. For example, the LESCANT model by Victor [16] focuses on Language, Environment and Technology, Social Organization, Contexting, Authority conception, Non-verbal behavior, and Temporal conception.

In this article, I focus on perception of colors, as colors appear to have a strong influence on perception of information. Colors are a part of the “Nonverbal Behavior” dimension in the LESCANT model, further divided into active and passive nonverbal behavior. Active behavior includes communication through movement, appearance, eye behavior, touching behavior, space usage, and sound. Passive nonverbal behavior is related to colors, numbers and counting indicators, symbols, and smells.

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## II. SYMBOLISM AND COLORS

Colors aspect seems to be one of the easily adjustable ones in graphical user-interface design. A graphical user interface (GUI) lets users interact with electronic devices through graphical icons and visual indicators such as secondary notation and color is a natural way of enlivening the interface [9].

A thorough exploration of a range of sources failed to provide comprehensive and explicit information on the most common perception of colors in different national cultures. However, some sources give information that might be useful at least for estimation [11]. According to [1], “the colors play an important role in shaping linguistic world model, as every color in different linguocultural communities involve certain associations, certain color preferences”. Kudrina and Mescheryakov [7] collected and analyzed verbal associations within Russian speaking (Russia, 145 people), English speaking (USA, UK, Canada, Australia, 110 people), German speaking (Germany, Austria and Switzerland, 136 people) and mixed European cultures (France, Italy, Spain, Malta, Greece, Belgium, Finland, 65 people, speaking English). Instead of countries that are often used for defining the borders of the cultures (for instance, by Hofstede [4], that lead to some criticism from McSweeney [10]), they used language that people spoke for building cultural entities. According to Hofstede’s theory, Germany, Austria and Switzerland are quite different in their behavioral component, but neither the reason for these differences was mentioned nor which of the similarities can be caused by the same language usage. Nevertheless, these results provide for an interesting comparison with my study (especially the part related to the German and Russian speaking countries). They even made the same kind of linguistic associative analysis (see Tables I, II). Moreover, their study is quite recent, which is very important since language and associations are context and time dependent. The disadvantage of their study is that the frequency for every association is not mentioned.

TABLE I  
SEMANTIC ASSOCIATIONS ON COLORS [7] COMMON ASSOCIATIONS UNDERLINED BY THIS AUTHOR.

Color	Russian speaking culture	German speaking culture
Black	<u>Elegance</u> , sophistication, <u>formality</u> , solemnity, luxury, wealth, people with dark skin; calm, <u>religious associations (including monks)</u> , <u>cars</u> (as a symbol of luxury), Malevich's black square, the black hole	<u>Elegance</u> , style, <u>formality</u> , solemnity, dignity, illegal, criminal, <u>the Catholic Church, including monks</u> , priests, youth movements (Goths, emo, anarchists), music (rock, blues, gothic music), <u>cars</u> , motorcycles, ink, a chimney sweep
White	<u>A hospital, doctors, religious associations (angels, God)</u> , death, childhood, something infinite, something unknown; truce, grey hair (specific of Russian language), <u>a polar bear</u> , <u>paper</u> , ceiling, cotton wool	<u>Religious associations (angels, etc.)</u> , <u>a hospital, doctors</u> , <u>death</u> , neutrality, emptiness, boredom, anger, contrast (black), <u>paper</u> , porcelain, wall color, sugar, <u>a polar bear</u>
Red	Beauty, beautiful, something better; celebration, <u>the color of communism</u> , <u>the Soviet Union</u> , the revolutionary activities, <u>a symbol of danger and prohibition</u> , <u>the color of the speed</u> , death, war, <u>bullfighting</u> , Spain, a symbol of football clubs	Left-wing political parties, <u>the color of communism</u> , <u>the Soviet Union</u> , <u>a symbol of danger and prohibition</u> , <u>the color of the speed</u> , the devil; <u>bullfights</u>
Yellow	Madness, insanity, betrayal, separation, <u>warning, something that attracts attention</u> ; childhood, pastry (including pancakes).	Envy, <u>attracting attention (warning sign)</u> , vacation, holiday, Maya the Bee (a German book), yellow as a symbol of the organization, the color of post in Germany, Borussia Dortmund soccer club
Green	Melancholy; <u>permission, providing freedom of action</u> ; Islam, The New Year (the color of Christmas tree), <u>ecology</u> and animal welfare (green movement); <u>hope</u>	<u>Hope</u> , <u>ecology</u> , green party, <u>permission, providing freedom of action</u> , happiness, luck, health, money, marijuana, the color of the police and army (not anymore)
Blue	Blue as a symbol of <u>masculinity</u> , strength, power, <u>positive features of temper</u> , freedom, dream, <u>jeans, ink and pens</u> , ethnical color of Russia	Alcohol, drunk, trust and reliability, clarity, simplicity, logic and order, <u>positive features of temper</u> , business and business relationships, the color of <u>masculinity</u> , the preferred color of cars; <u>jeans, ink and pens</u> ; vacation at seaside

Reference [12] also mentioned that there are some differences between categorizing and explaining color in different cultures and languages, which can affect perception as well. Eskimos, for instance, have hundreds of ways to describe the color of snow. In Russian language, on the other hand, there is a specific word for sky-blue, which does not exist in many European languages. In addition, color combinations in some countries can produce meanings that are almost opposite to the associations with separate colors, and this should also be considered [14].

**III. RESEARCH METHODS**

Recommendations on cultural adaptation of websites were developed with the WebSCA framework [13]. To verify these, a questionnaire consisting of 68 questions was built. The questions were translated into Russian, German and English (for Finland). I used Surveymonkey.com services to post it, share it, collect the answers and calculate some simple analytics such as percentage and trends. The total number of analyzed responses is 72 in Russia, 26 in Finland and 26 in Germany. Of the Russian participants, 80.56% are from Moscow, the capital of Russia, which can be biased, since inhabitants of one region cannot be considered sufficiently representative when analyzing such a big country as Russia. Likewise, the study was carried out in English in Finland, not in the national languages of Finnish or Swedish, and therefore the sample includes only people who can understand English.

**IV. RESEARCH RESULTS**

The survey showed that pink is the color to avoid while creating a website in all three countries. Brown is to be avoided in Russia and Germany. In Russia, also yellow is disliked.

In online shops, it is important to maintain trust in the eyes of the buyer. Colors associated with trustworthiness are as follows: blue in all three countries, green in Germany and Russia, and white in Finland and Russia.

In one of the questions, people were asked to provide their emotional associations on the range of colors listed in a Table II. Their preferences can give clues for choosing the color theme for a website according to the expected effects it should produce. Numbers in brackets stand for the number of respondents who had the same association on a particular color, so the higher the number is, the higher of a value this reply has. In Table II, the associations mentioned more than once are listed.

TABLE II  
EMOTIONAL ASSOCIATIONS ON COLORS

Colors/Countries	Germany	Finland	Russia
Black	death (2), plain (2), elegant (3), sad (3), dark (3), depressing (2), gloomy (5), mourning (3)	dark (5), strength(2)	neutrality (2), serenity (4 ), confidence (2) , sadness (13) , severity (7), sorrow (2), fear ( 5 ) intrigue (2) , power ( 2), mourning (3), depression (2), weight (2), elegance (4 ) , gloom (3), shame (2)
White	plain (2), clean (4), innocent (2), bright (2), boring (2), pleasant (2), pure (5), reputable (2), wedding (2)	emptiness (3), pureness (4), clean (8), clearness (2), bright (2), innocence (2)	calmness (12), neutrality (5), appeasement (4), tenderness (4), sincerity (2), purity (8), kindness (3) lightness (2), openness (3), innocence (2) trust (3), a hospital (2), sadness (2), airy (2), indifference (3)
Blue	quietness (2), cozy (2), relaxing (2), cool (2), trust (2), wide (2), cold (2)	conservative (2) (dark blue for 1), cool (2), calmness (2), sea (2)	joy (7), serenity (2 ), stability ( 2), generosity (2), sky (2), confidence (3), appeasement (2), depth (2 ), freedom (5) , peace (16), sea (2)
Green	nature (2), natural (4), fresh (3), lively (2)	nature (5), natural (3), warm (2), relaxing (2), forest (2)environmental (2), calm (2),	friendliness (2), joy (12), trust (10), energy (2), calmness (15), freshness (2), emotional upheaval (3), good-nature (2), grass (2), serenity (2), hope (2)
Red	aggressive (4), attracting attention (2), fiery (3), passionate (2), warmth (5), strength (3), anger (2), love (4)	fierce (2), passion (5), dangerous (4)	aggression (10), passion (17), anxiety (2), love (6) delight (2), anger (2), rage (5), irritability (3), danger (4), alarm (3), anger (2), joy (2), attracted attention (2), excitement (4)
Yellow	warm (5), summer (3), sun (6), merry (4)	joy (2), warm (2), sun (4), happiness (9), bright (3)	positive (3), joy (25), cheerfulness (3), distrust (2), happiness (2), warmth (7), infantilism (2), irritation (3), sun (2), anguish (2), brightness (2)

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Pink	lurid (4), childish (3), girly (3), untrustworthy (2), female (3)	childishness (3), love (2), feminine (3), girly (3)	ease (3), dreaminess (2), tenderness (16), light-mindedness (2), carelessness (3), love (3), hostility (2), childhood (3), disgust (2), naivety (4), joy (4), little girls (2), irritation (3)
Purple	cozy (2), pleasant (3), beautiful (2), female (3)	religious (2)	sorrow (6), tenderness (2), interest (4) surprise (4), curiosity (2), sadness (3), mystery (2), joy (2), confidence (2), serenity (2), fatigue (2)
Brown	dirty (4), natural (4), earthy (3), warm (2)	boring (2), neutral (3), down-to-earth (4), chocolate (2), everyday (2)	comfort (5), serenity (4), warmth (4), sadness (4), neutral (2), confidence (2), envy (2), tree (2), autumn (2), stability (3), boredom (3), dirt (2), anguish (4), chocolate (2), reverie (2)

## V. ANALYSIS OF THE RESULTS

Analyzing this table of associations and comparing it with some findings of Kudrina and Mescheryakov [7], some conclusions concerning the selection of a website color theme can be drawn. However, this comparison might be limited because the questions were formulated in two different ways. They use mainly nouns and things as associations, while my respondents gave often adjectives to explain their emotions and feelings. It should be noted that some color combinations produce associations that are different from the ones of separate colors.

When thinking of the black color, 19.2% of German respondents find it gloomy, and equally 11.5% - elegant, sad and dark. In Finland, it is associated with darkness for 15.6% as well, and for 6.2% - with strength. In Russia, many people mentioned sadness (14.3%) and severity (7.7%). Some also came up with fear (5.5%), elegance (4 - 4.4%), and serenity (4 - 4.4%). In a table from [7], elegance is mentioned by both German and Russian speakers as well as in my study. This color seems to fit the website for the fashion and luxury industries, like sellers of classic clothes, watches, cars and the like.

Thinking of white in Germany, the most respondents used the words clean (15.4%) and pure (19.2%). In Finland, the result was the same: clean (25%) and pureness (12.5%). In Russia, people thought rather of calmness (13.2%), purity (8.8%), neutrality (5.5%), appeasement (4.4%), and tenderness (4.4%). This color is one of the commonly used on many popular websites nowadays, and it seems to bring rather positive associations.

For blue in Germany, the respondents had many associations with rather a positive and neutral meaning, but only few people recalled the same words for describing their feeling caused by this color: quietness (7.7%), cozy (7.7%), relaxing (7.7%), cool (7.7%), trust (7.7%), wide (7.7%), and cold (7.7%). In Finland, the situation is very similar although the color seems to have different meaning in people's minds: conservative (6.3%), cool (6.3%), calmness (6.3%), and sea (6.3%). In Russia, the main association is peace, that came in mind of 16 people out of 91 (17.6%), 7.7% thought of joy and 5.5% of freedom. In a table by Kudrina and Mescheryakov [7], masculinity and positive features of temper were the common associations for Russian and German speaking respondents. These findings do not contradict my previous conclusions that blue color might and should be used when trying to create a peaceful and trustful image of a website.

Green for many respondents from Germany means natural (15.4%) or nature (7.7%), lively (7.7%) and fresh (11.5%). In Finland, nature and natural are the popular associations as well (15.6% and 9.4% accordingly), some respondents also think of it as warm (6.3%), relaxing (6.3%), environmental (6.3%), calm (6.3%), and forest (6.3%). In Russia, green is associated with calmness (16.5%), joy (13.2%), and trust (11%). Permission, freedom, ecology and hope were mentioned both by Russian and German speakers in [7]. The same as with blue, green is a most neutral one, providing positive associations.

Red in Germany stands for warmth (19.2%), aggressive (15.4%), love (15.4%), fiery (11.5%), and strength (11.5%). In Finland, people associate it with passion (15.6%), dangerous (12.5%), and some with fierce (6.3%). In Russia, it stands for passion (18.7%) and aggression (11%) as well as for love (6.6%), rage (5.5%), danger (4.4%), and excitement (4.4%). Reference [7] also mentions danger as a common association in their study. Red is to be used rather consciously for attracting attention to the separate parts of the web page.

Yellow color has positive associations among many respondents. In Germany, when thinking of yellow people think of sun (23.1%), warm (19.2%), summer (11.5%), and merry (15.4%). In Finland, they think of happiness (28.1%), also sun (12.5%), bright (9.4%), joy (6.3%), and warm (6.3%). In Russia, in a similar way joy (27.5%) and warmth (7.7%). This is also a color for attracting attention in many countries, and the respondents from Russian and German speaking countries in the earlier study [7] confirmed that. Therefore it is rather surprising that this association was not common (although still mentioned) among the respondents in my study, making it impossible to draw an exact conclusion about possible usage of yellow in the website layout.

Pink, purple and brown were not mentioned by [7], preventing further comparison. Popular associations on pink in Germany might be expressed using the following words: lurid (15.4%), childish (11.5%), girly (11.5%), female (11.5%), and untrustworthy (7.7%). In Finland, respondents often mentioned childishness (9.4%), love (6.3%), feminine (9.4%), and girly (9.4%). In Russia, the most common association is tenderness (17.6%). Several people also agreed on ease (3.3%), carelessness (3.3%), love (3.3%), childhood

(3.3%), naivety (4.4%), joy (4.4%), and irritation (3 - 3.3%). Even though these associations are not really negative in most of the cases they still confirm the assumptions. Pink color should be used very carefully since for most of the people, it has very specific associations and the majority in the studied countries cannot call it their favorite color. It might probably fit a very specific target audience and theme of the web project.

Purple color in Germany recalls the words such as pleasant (11.5%), female (11.5%), cozy (7.7%), and beautiful (7.7%). In Finland, no common trends were discovered, only two people agreed on “religious” (6.3%). In Russia, the situation is the same, associations are quite widely spread, and the repetitive ones are as follows: sorrow (6.6%), interest (4.4%), surprise (4.4%), and sadness (3.3%). According to these findings, purple is to be used only in Germany, but due to the limited number of respondents, and especially ones from Germany, further research is needed before any conclusions can be drawn.

Brown color is commonly associated with words like dirty (15.4%), natural (15.4%), earthy (11.5%), and warm (7.7%) in Germany; down-to-earth (12.5%), neutral (9.4%), boring (6.3%), chocolate (6.3%), and everyday (6.3%) in Finland; and comfort (5.5%), serenity (4.4%), warmth (4.4%), sadness (4.4%), and anguish (4.4%) in Russia. Hence, associations to this color are contradictory. Using brown appears very context-dependent. It might be appropriate for websites of coffee shops, chocolate or tea sellers and - when combined with green – for sites focused on environment.

## VI. CONCLUSIONS

Based on the replies collected and analyzed as a result of the survey, the influence of colors on website users is shown not to be extremely strong, but significant enough to make it worth being considered, especially in the case of Russia. When creating a culturally adapted website, web developers should avoid using brown and pink for Germany, pink for Finland, and brown, yellow and pink for Russia. In all these countries green, blue and white seem to be associated with trust, thus preferable when this reaction is desirable. The emotional associations on different colors (Table II) might also be considered when developing a GUI for the particular country. There are colors that lead to positive associations in all the three studied cultures. Therefore, it is possible to develop a rather universal and international color scheme that will be pleasant for all the visitors from these countries. This can reduce the production costs for web design. Further research on colors, color combinations and color dependence on the context and content of a website is still needed. This could be efficiently carried out by using A/B (two-sample hypothesis) testing methods where during the randomized experiment the performance of different pages layouts or elements could be measured. In addition to that, more respondents could be attracted via professional paid survey panels with possibility of exact geographical and language targeting.

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