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Successful Requirements for Commercial Smartphones Applications in Arabic Gulf countries

Adel A. Bahaddad[1,*], *Thikraa M. Alharethi*[2], *Faisal A. Algowter*[3], *Ali Alshehri*[4], *Ibrahim S. Alkhazi*[4], *and Wahid Rajeh*[4]

[1] Information Systems Department, Faculty of Computing and Information Technology, King Abdulaziz University, Jeddah, 21589, Saudi Arabia

[2] Deanship of Digital Transformation and Knowledge Resources, Najran University, Najran, 61441, Saudi Arabia

[3] Department of Computer Science, College of Computer Science and Information Systems, Najran University, Najran, 61441, Saudi Arabia

[4] Department of Computer Science, College of Computers & Information Technology, University of Tabuk, Tabuk, Saudi Arabia

Abstract: Pest detection is a vital feature of agriculture and ecosystem organization, intended to classify and mitigate the power of harmful organisms on crops and the atmosphere. By automating the recognition procedure, researchers and farmers can improve accuracy in pest organization, enhance resource allocation, and finally donate to sustainable and strong farming practices. Leveraging innovative technologies like computer vision (CV) and machine learning (ML), pest recognition techniques can examine images and sensor information to recognize the presence of pests in agricultural areas. Pest classification utilizing pattern detection and DL contains the growth of sophisticated methods to mechanically recognize and classify numerous pests. This incorporated technique connects the powers of traditional pattern detection approaches and the learning abilities of deep neural networks (DNNs). DL, particularly Convolutional Neural Networks (CNNs), has shown amazing victory in learning complex patterns straight from raw data. By using DNNs, the method can mechanically learn hierarchical representations, enabling it to discern complex features and relationships in pest-related data without clear feature engineering. In this aspect, this study introduces a fusion of the Modified Artificial Hummingbird Algorithm with Deep Learning-based pest detection and classification (MAHADL-PDC) technique. The MAHADL-PDC technique aims to effectually recognize distinct pests' types. The input image quality is enhanced by the adaptive median filtering (AMF) approach. In addition, feature extraction using the EfficientNet-B4 model is performed to learn complex features, and its hyperparameters were chosen by utilizing MAHA. The MAHADL-PDC method uses the deep belief networks (DBNs) model to detect and classify pests. To highlight the significant performance of the MAHADL-PDC method, a series of experiments were made. The performance validation of the MAHADL-PDC approach portrayed superior outcome over existing models.

Keywords: GCC, DeLone and McLean Model, M-Commerce, smartphones.

1 Introduction

Many researchers try to investigate the reasons of e-commerce industries slowly growth in middle east. One of the main reasons noted that Information and Communication Technology (ICT) readiness, cultural issues, privacy issues, trust, absence of clear regulations, rules, legislation and processes to protect the rights of the parties involved [1]. Arab cultural and traditional issues are slightly different from foreign companies that currently design and implement commercial websites and mobile applications around the world [2]. Furthermore, a study conducted on a sample of 108 small and medium businesses in Saudi Arabia during 2018 presented that 10% of these companies had actual online trading websites and only 40% had websites or online communication channel to display their products and communicate with their customers efficiently [2]. A number of some SME conduct their market through various social media applications to reduce the marketing expenses than to working for designing fully applications because they have unwillingness for purchasing their products online [2]. The main problem could be related to the designing technical issue. Therefore, the gap between Arab and foreign websites should be identified to meet

* Corresponding author e-mail: Dbabahaddad10@kau.edu.sa

the target audience requirements [1]. As mentioned in literature review, using the online purchasing website widely is related to user trust and adapt wide access to online selling websites. This aspect is supported by relevant government agencies to get the main benefit from in governance and increase the level of confidence through independent organizations and formulating the required policies to assist transformation based on the 2030 vision [2]. This can only be achieved if e-commerce applications are redesigned to meet the requirements of the target segment [3].

This research focuses on the successful requirements for using mobile commerce applications in GCC. The research questions what are the main requirements that should be addressed to adopt a successful framework and activate M-commerce and lead to increased levels of consumer acceptance in online purchasing? The research question is identifying the requirements that are identified in the literature review, then they can be tested and examined for e-commerce applications from GCC's societies opinion. This study contains the following points which are the literature review, theoretical framework, methodology, data analysis, model testing, main findings, discussion, and background of the implications of e-commerce in the GCC countries.

2 LITERATURE REVIEW

Many aspects in previous earlier studies are very important to understand the fundamental aspects that are need to design this study. These aspects are Mobile application evaluation, Factors affecting the design of M-commerce applications, and Theoretical Framework.

2.1 MOBILE APPLICATION EVALUATION

Several studies in commercial applications evaluation field focus to address the fundamental requirements of the target audience, such as ease to use and system, service, and information quality that are provided to customers. According to Albashrawi study, there are 15 influencing factors that are that will beneficial to adopt M-commerce. These factors can be classified into three main groups which are environmental, organisational, technological groups [4]. Another study conducted by Swaid and Suid in 2018 which identified five main groups for the consumers' requirements in M-commerce applications. First, the efficiency that is focused on the compatibility between the information data sources in the applications as well as achieving the primary goal of the application. Second, customer satisfaction through provides communication channels that might be helpful to increase the level of satisfaction and send positive feedback to

them. Third, ease to use so the users are able accomplishes their transaction through commercial applications easily and conveniently. Forth, the possibility to store basic information and transported through the application facilities and should provide to retrieve user information easily. Finally, the commercial application must have as minimum number errors as possible [5].

2.2 FACTORS AFFECTING THE DESIGN OF M-COMMERCE APPLICATIONS

Many studies emphasise the importance to apply the requirements of adoption and deployment of M-commerce applications [6]. Therefore, these studies focused to identify the requirements that might be helpful to design commercial applications depending on different communities' expectations and the resulting deficiencies to fill these gaps example of these studies [7,8]. Furthermore, these applications need to fulfil the knowledge requirements of the end-users, thereby allowing them to make timely proper decisions. It is also useful to identify the M-commerce requirements to design appropriate framework for requirements of target population in the Gulf region [9,10]. Many indicators were collected which represents the general requirements in various studies that were conducted in commercial websites or applications and according to particular requirements of specific communities. These indicators are divided into six main groups which are Appearance, Content, Organisation, Interaction, Customer-Focus, and Assurance.

3 THEORETICAL FRAMEWORK

The theoretical framework focuses on integrated study of relationship between requirements of M-commerce applications and increases the level of successful through ISS model. The ISS Model is defined and designed by [11]. This model has been developed through a variety of experimental studies, such as [11,12]. The main goal of this development is improving the dimensions that are used to measure the level of performance in specific systems..

4 METHODOLOGY

The research method of this study is dealing with the questionnaire as appropriate way to collect data from target segment. There is shortage in audience awareness about determining the fundamental requirements for the target audience leads to ask them about their opinion

Table 1: The Number of Research Moderators by Group

	KSA		Qatar		UAE	
Category of Participants	No.	%	No.	%	No.	%
All participating	386	100%	171	100%	246	100%
Q1. Gender						
Male	225	58.3	101	59.06	135	54.9
Female	161	41.7	70	40.94	111	45.1
Q2. Age group						
Young (35 years or less)	250	64	111	65	132	54
Old (35 years or old)	136	36	60	35	114	46
Q3. Current Educational level						
Postgraduate & above	200	51	88	51	115	47
Undergraduate & below	186	49	83	49	131	53
Q4. How regularly do you purchase online						
High (more than one a month)	193	50	91	53	133	54
Low (less than one a month)	193	50	80	47	113	46

about the requirements that were collected from previous studies in M-commerce field. It has been using Likert Scale to identify the important requirement for participants.

In the meantime, it was added open question for the participants who willing to add more requirements. The survey question was including the six constructs related to the theoretical framework which are SQ, IQ, SQU, US, IU, & NB, as well as the basic requirements groups which are AP, OR, CO, IN, AS, and CF, and their total indicators was 84 indicators.
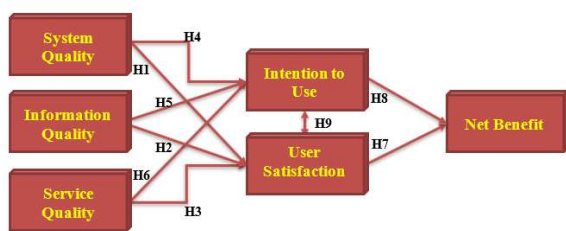
Fig. 1: DeLone and McLean's ISS Model with Hypothesis

Data gathering through online questionnaire to be accessed widespread and it was used as the social media and mailing lists to send a questionnaire to largest possible number [13,14]. The conditional questions were added in the survey to ensure the qualification experience of target audience, so it was put three questions which are the previous experience in M-commerce, and participant resident in GCC's region, and are previous online purchased through online purchasing channels [13]. The total of accepted responses was 803 from KSA, Qatar, and UAE. The sample number was calculated according to the number of people who using smartphones According to the statistics of the Ministry of

Communications and Information Technology in the target countries, and the confidence level of sample was 95% and margin acceptable error was 7.5%.

5 DATA ANALYSIS

The analysis part focuses to test the validity of theoretical framework. This part includes Factor Analysis, Structural Equation Modelling (SME), Measurement Model Results, and the model hypothesis test.

The number of results is presented in Table 1.

5.1 EXPLORATORY FACTOR ANALYSIS (EFA)

The EFA trial comprises of two major phases which are extraction of the factors as well as interpretation and rotation of the factors Pallant 2005. In this research, the factors were removed using Principal Components Analysis (PCA) through numerous standards, such as Latent Roof Criterion, the Catell's Screen Test, as the Priority Criterion& the Percentage of Variance Criterion [15].

5.2 SEM OVERVIEW

SEM is an extension of several tools that is used to test the indicators and muddling fit in this study. SEM allows the use of multiple indicators to measure multiple variables, such as constructs with focusing on account errors that appear when analyzing data statistically [15]. The SEM part concentrate to scale and measure the relationships between variables and constructs accurately, evaluate the structural model, and evaluate the relationship between the constructs [15]. These steps are necessary to estimate the fit of the model that was based in this study on similar procedures and criteria used in CFA tests.

5.3 MEASUREMENT MODEL SPECIFICATION AND ASSESSMENT CRITERIA

In this technique, researchers fundamentally conclude the specifications of the model distribution and exact values evaluation. The CFA measurement model highlights the union between entire the variables to assist the constructs that cannot be measured directly [15]. In this study, the researchers developed an evaluate the main model after integrating the different models that have been presented previously into a single model (Fig. 1). This model included 3 layers:

–Level 1: it contains indicators that provide measuring.
–Level 2: it contains indicators the ISS model main constructs that included quality structures that include system, information, and service constructs. These are called system requirements.
–Level 3: it contains the ISS model included user satisfaction, intent to use, and net benefits structures. This is named as providing consumer behaviour.

The researchers analyzed the evaluation plan using the CFA tools. Column 1 in Table 4 presents the central test and suggested values for the CFA assessment of the model fit criteria.

Depending on the Eigen value, the Screen Test, the priority

criterion and the Percentage of Variance Criterion Test, the hierarchies that focus on specifying the fundamental indicators of acknowledgement of marketable purchases via smartphones were deduced.

Table 2 shows the pointers formulated as an explanation for executing the ISS model. The proportion of incremental variance heaved about 68%, is contemplated to be satisfactory for solutions in the field of social sciences [15]. 17 pointers were eradicated from all the pointers of this research because their values were between 0.5 during

the EFA process.

Eventually, the Cronbach's alpha coefficients for all the pointers were high and they varied between 0.617 and 0.911, which led to reasonable inward viscosity between the pointers no less than 0.60 [16].

At this level, current sub-groups arose based on the correlations between the pointers as shown in the appendix B. The indicators in the previous constructs were extracted into a number of new constructs. The results for all of the countries in the study sample are presented together. Furthermore, new constructs that were output from the EFA and CFA results have been updated and the indicators that belong to each of the constructs have been identified. These constructs were the results of the EFA and they were confirmed during the CFA. Therefore, the constructs have been renamed and recoded, as follows:

The researchers performed more tests to strengthen their previous assessments, which included composite reliability (CR) and extracted mean variance (AVE). These tests were considered accurate during the CFA stage. When the CR value is high, the indicators showed higher reliability in the constructs [15]. In this study, CR value $\geq 0.6.6$. The AVE value should be, while the factor loading value is > 0.50 [15]. The relationship between entire constructs must be less than the square root of AVE. This indicates a healthy differentiation between the built-in model and the final evaluation of the model's outcome [17]

The results provide the relationship in the constructs less than the square root of correlation of the constructs. In addition, the AVE values are ≈ 0.5 and CR values also ranged from 0.7324 to 0.9346.. The maximum value of the multi-squared correlations is 0.774 and the minimum value is 0.469. AVE values ranged from 0.7915 and 0.4706. The discriminative validity of the above indicators can easily achieve the requirements of the model developed to implement commercial applications in smartphones. An evaluation of the model results is provided in Appendices (A & B).

Figure 3 presents the results of a hypotheses test that linking to constructs in the model. The in this study are categorized into two main groups, which are model test hypotheses and mediators test hypotheses. Firstly, hypothesis of SQ, IQ, SQU, and ISS hypothesis. Secondly, the moderators' hypothesis group that focus on the four main moderators in the research model. The researchers evaluated the hypotheses presented in the study by testing scale reliability, convergent validity, and discriminatory validity. These main test have been criteria recommended by[17].

The results of SQ constructs (AP and OR constructs) showed a significant relationship between the SQ constructs and their indices. This indicates the relationship between the correlation values from 0.168 to 0.283. The researchers used the T-value to display convergent certainty results for all constructs. The T-value indicates a parameter to calculate the conceptual value and the final error. In this study the T-value ranged from 5.507 to 3.491 (see Appendix A), indicating that the T-values are within the mean values of the scaling (Hair et al., 2010). Moreover, CO, IN and AS, related to IQs, showed good correlation coefficient values. These values ranged from 0.493 to 0.347, while T-values varied from 8.285 to 6.170. Regarding the CF constructs, assigned to SQU, the correlation coefficient values ranged between 0.131 and 0.488, which is significant. Their T-values ranged from 3.404 to 5.920. For ISS constructs, the range of correlation values is from 0.213 to 0.472, and all combinations were significant. The T-values for these ISS constructs ranged from 4.255 to 8.273. This indicates that all constructs showed good correlation in the T-value which should be equal or more 1.96. furthermore, Cronbach's alpha values for the various constructs ranged

Table 2: Summaries of EFA Results of all Samples together

Previous code	Sub-groups of constructs	No. of indicators	New code	Indicators Removed by EFA	KMO	Cronbach's Alpha	Cumulative Variance	Total No. in each group of constructs
System Quality constructs (Appearance and Organisation indicators are extracted into four constructs)								
AP	The Appearance Balanced construct	5	AP_AB	5	0.840	0.832	68.121	15
	The Colours and Texts construct	4	AP_CT					
OR	The Planning and Consistency construct	4	OR_PC					
	The Navigation Links construct	2	OR_NL					
Information Quality constructs (Content construct, Interactive, and Assurance are extracted into seven constructs)								
CO	The Update Relevant Information construct.	3	CO_UI	6	0.887	0.908	68.188	30
	The Accurate and Relevant Data construct	3	CO_AD					
	The Content Display construct	2	CO_CD					
IN	The Multimedia Adoption construct (IN_UI).	2	IN_UI					
	The Adaptability construct (IN_AD).	4	IN_AD					
	The Customer Advisor construct (IN_CD).	5	IN_CD					
AS	The Assurance construct (AS).	11	AS					
Services Quality constructs (Customer Focus construct is extracted into four constructs)								
CF	The M-loyalty Building construct	2	CF_MB	4	0.888	0.889	68.141	12
	The Customer Chat construct.	3	CF_CC					
	The Help and Technical Support construct.	3	CF_HT					
	The Credibility Build construct.	4	CF_CB					
ISS constructs (Customer Focus construct is extracted into four constructs)								
ISS	System Quality	2	SQ	7	0.729	0.701	68.142	17
	Information Quality	3	IQ					
	Service Quality	3	SQU					
	Intention to Use	3	IU					
	User Satisfaction	3	US					
	Net Benefit	3	NB					

Table 3: Correlation Matrix and Discriminant Validity of the Measurement Model

The AVE of System Quality Constructs

Construct – Code	AP_AB	AP_CR	OR_PC	OR_NL	Mean	SD
AP_AB	0.710				4.2994	0.6922
AP_CR	0.417	0.708			4.0881	0.8210
OR_PC	0.461	0.281	0.783		4.4209	0.6085
OR_NL	0.397	0.259	0.676	0.826	4.6451	0.5415

The AVE of Information Quality Constructs

Hypothesis No.	The relationship for path	CO_UI	CO_AC	CO_CD	IN_MA	IN_AD	IN_CA	AS_ALL	Mean	SD
IQ_01	CO_UI	0.728							4.4251	0.6551
IQ_02	CO_AC	0.573	0.772						4.1606	0.7703
IQ_03	CO_CD	0.434	0.427	0.778					4.4938	0.7090
IQ_04	IN_MA	0.364	0.414	0.352	0.760				4.2989	0.6946
IQ_05	IN_AD	0.588	0.407	0.393	0.633	0.728			4.4645	0.6448
IQ_06	IN_CA	0.333	0.466	0.281	0.628	0.578	0.760		3.9288	0.7956
IQ_07	AS_ALL	0.373	0.326	0.302	0.364	0.490	0.379	0.768	4.6599	0.5948

The AVE of Service Quality Constructs

Hypothesis No.	The relationship or path	CF_HT	CF_MB	CF_CC	CF_CB	Mean	SD
SQU_01	CF_HT	0.890				4.6613	0.5745
SQU_02	CF_MB	0.451	0.883			4.5160	0.7240
SQU_03	CF_CC	0.438	0.517	0.797		4.3454	0.6693
SQU_04	CF_CB	0.581	0.584	0.577	0.781	4.6989	0.5439

The AVE of ISS Constructs

The relationship or path	US	SQ	IQ	SQU	IU	NB	Mean	SD
US	0.832						4.636	0.577
SQ	0.228	0.815					4.457	0.719
IQ	0.472	0.542	0.775				4.554	0.631
SQU	0.428	0.092	0.179	0.773			4.447	0.683
IU	0.213	0.363	0.283	0.239	0.849		4.102	0.744
NB	0.215	0.048	0.315	0.132	0.324	0.795	3.996	1.016

from 0.893 to 0.617, while CR values ranged from 0.9346 to 0.6153, and multi-squared correlation values to range from 0.774 to 0.469.

In the main time the results of AVE values ranged from 0.7915 to 0.5006 which showed a good internal correlate among all indicators in the model [17]. These results showed that the benchmark for smartphone commercial applications reflects a high degree of convergent certainty. Similarly, the relevant correlation coefficient values should be > 0.85, which indicates the validity and satisfactory of the characteristic scale [18]. The researchers used AVE values to determine discriminative certainty by distinguishing the square root of AVE with the result of each constructs in the model. The results indicated that related to the same group in the model [17]. Table 3 shows the square roots of the AVE values in dark colour. The researchers also performed "quality of fit" tests for each construct using each sample in the survey (Table 4). The results provide a balanced model that contains the recommended values, and the association between the model structures in the different samples. It was also noted that indicators have a viable value in the research model.

Table 4: Model-Fit Indices of the Research Model Constructs

The goodness-of-fit & Recommended Value		System Quality	Information Quality	Service Quality	Other ISS constructs	The Result for the samples			
						KSA	Qatar	UAE	ALL
X²/df	≤ 3.00	3.58	4.112	3.402	2.904	3.229	2.982	2.908	3.100
GFI	≥ 0.9	0.957	0.873	0.958	0.990	0.915	0.856	0.892	0.945
TLI	≥ 0.9	0.936	0.833	0.94	0.985	0.892	0.853	0.887	0.924
NFI	≥ 0.9	0.918	0.816	0.936	0.970	0.854	0.769	0.825	0.910
CFI	≥ 0.9	0.948	0.853	0.954	0.990	0.911	0.878	0.907	0.936
IFI	≥ 0.9	0.948	0.854	0.954	0.990	0.913	0.882	0.909	0.937
AGFI	≥ 0.8	0.942	0.847	0.936	0.981	0.887	0.809	0.856	0.927
RMR	≤ 0.8	0.020	0.022	0.015	0.019	0.02	0.034	0.029	0.019
RMSEA	≤ 0.8	0.044	0.062	0.055	0.025	0.056	0.067	0.06	0.047

Table 5: Path Coefficients, t-values, and P-values of the Commercial M-commerce application Hypothesis

The relationship for path	Standardised regression coefficient	Critical ratio or (t-value)	P-value	Significance (Y/N)	The relationship for path	Standardised regression coefficient	Critical ratio or (t-value)	P-value	Significance (Y/N)
AP_AB → SQ	0.283	5.507	0.001	Y	CF_MB → SQU	0.219	3.404	0.03	Y
AP_CR → SQ	0.174	3.491	0.002	Y	CF_CC → SQU	0.131	3.545	0.009	Y
OR_PC → SQ	0.168	3.621	0.001	Y	CF_CB → SQU	0.488	4.764	0.02	Y
OR_NL → SQ	0.210	4.315	0.003	Y	SQ → IU	0.363	5.254	0.005	Y
CO_UI → IQ	0.411	7.052	0.001	Y	SQ → US	0.228	4.743	0.001	Y
CO_AC → IQ	0.347	6.170	0.002	Y	IQ → IU	0.283	6.581	0.003	Y
CO_CD → IQ	0.353	6.217	0.001	Y	IQ → US	0.472	8.273	0.001	Y
IN_MA → IQ	0.412	6.575	0.003	Y	SQU → IU	0.239	7.481	0.002	Y
IN_AD → IQ	0.493	8.285	0.004	Y	SQU → US	0.428	5.508	0.003	Y
IN_CA → IQ	0.434	7.822	0.002	Y	US → IU	0.213	4.255	0.009	Y
AS_ALL → IQ	0.381	7.497	0.001	Y	IU → NB	0.324	6.472	0.005	Y
CF_HT → SQU	0.345	5.920	0.04	Y	US → NB	0.215	5.307	0.006	Y

5.4 THE MODEL HYPOTHESIS TEST

The basic assumptions regarding this model consist of 24 assumptions covering the proposed overall model. The relationships between the constructs are shown in Table 5 and relevant correlation coefficients, T-values, and P-values.

In this study, researchers aim to determine the requirements for a M-commerce application before it can be implemented in smartphones. This can help to fill in the research gaps mentioned in the literature because there is no clear distinction between indicators of e-commerce application in general and those indicators that mainly accepted by GCC society. Thus, the scaling model was developed after analysing the previous literature to determine the requirements for M-commerce applications. In the scaling model, the requirements for smartphone commercial applications consist of several indicators that are summarized in six constructs, which are subsequently divided into small sub-constructs to create the model. There was a clear distinction between the indicators in the SQ constructs, which consist of appearance and organization indicators and there is a significant statistical relationship between these constructs together. Additionally, IQ constructs on interactive, content, and assurance indicators. The SQU constructs of included customer service constructs indicators and requirements. As a result, after testing the

relationships between the constructs in the model, the same tests were performed to determine the possibility of model fit for each sub-samples for the study (Saudi Arabia, Qatar, UAE) separately. The results for all samples are significant and the results are shown in Figure 2.

5.5 MEASUREMENT MODEL RESULTS FOR DIFFERENT RESEARCH SAMPLES

The result of previous samples providing the fitting values according to several samples. The results indicate that very similarity between the model fitting in different societies, it can be seen a similar in several traditional aspects. Tables 2 & 3 provide a summary of the model fit indicators, the researchers tested the hypotheses of the study depending on each study sample, separately, to confirm that the model might be applied in various populations with slightly different characteristics (See Fig. 2).

The functions addressed in the previous parts find their importance in their focus on a specific segment, indicating the acceptance of commercial applications and
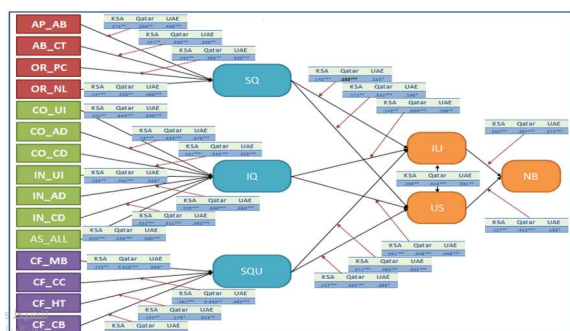
Fig. 2: The Relationship Measurement for Separated Samples together in ISS Hypothesis Model

the fact that the applications are in the process of being diffused to the broader society as a whole. In this study, the researchers focused on the functions that could help in accepting the implementation of the M-commerce applications in GCC societies. Five main aspects are the elements to determine and address the M-commerce requirements framework to consider for GCC through commercial applications (See Figure 3). Firstly, it is important to study components of these commercial application functions and clarify how they should be designed depending on Arabic characteristics and requirements. These functions are divided into many constructs of the ISS model. This review therefore focuses on the functions of each of the main constructs (SQ – IQ – SQU) separately and presents fundamental characteristics of GCC countries' different societal norms to facilitate the acceptance of these functions by the target audience. Secondly, this study involves the influence of traditional moderators on online purchasing acceptance. These moderators are significant to the statistical results of the hypotheses in all study samples as well as helpful in determining the parameters and characteristics of the target population. Accurate determination of the target audience in the beginning saves effort in that this audience's acceptance would impact other groups and help to further M-commerce applications access among the society as a whole. Thirdly, inclusion of the ISS model is important for the purpose of studying the traditional moderators and their impact on acceptance of online purchasing. With respect to this, focusing on the hypotheses previously tested that showed many significant statistical relationships is ideal. Fourthly, identifying the functions that would be various level of interested in the GCC communities of this study. It is important to be determined and identify related requirements of each community separately. Therefore, it is helpful to identify the functions that show high importance of specific community but less important to others. Finally, implementing the fu nctions to integrated applications, needs the functions to divide into three groups. These groups are technical, organisational, and

social groups: firstly, the application designers and developers who have abilities and skills to affect the practical decision for designing the applications; secondly, the online companies' staff who are dealing with online trading via the Internet have power to affect the organisational functions; thirdly, the social functions that would be affected by consumer targeted audience decision. These aspects are described in more detail in the following sections.

This part is focused specifically on five main aspects included in the fundamental elements of commercial applications for smartphones. These aspects might be helpful in determining the differences in the GCC communities' basic characteristics, as well as for identifying the target population's properties and the stakeholders that affect decisions concerning design functions, depending on the traditional perspective and traditional requirements of the target audience.

1. The injunctions were assigned amongst the processes with a similar objective and duty for decreasing the no. of functions that have to be developed in the consecutive phases. These regulations were assigned with SQ, IQ, and SQU, are classified based on the parity criteria of intake, processing and result. The 20 processes related to the 6 major denominations of pointers were AP, CO, OR, IN, CF and AS. All the processes were exchanged between the pointers and processes once the researchers identified the primary objective of every pointer. Thereafter, they were restored for litigation. The processes were categorised into public and special processes. The public processes affected the application screens, whereas the special processes affected only the distinct screens.

2. The Traditional characteristics (gender, age, education level, previous experience) that will help to determine the boundaries of the target population in general. These properties, which were built after dividing the study sample into equal groups, and the results show many statistically significant relationships that are very useful in determining the key factors of the target part. Identifying the main characteristics of the target audience will help to diffuse the online purchasing culture through smartphone commercial applications, because approximately 5% of the total community will accept the innovative system, and they can help to spread the new features of these systems among other segments of society [19]

3. Measuring the consumer behaviour characteristics in the research sample that represents the third component for using the smartphone applications in marketable; The consumer behaviour focuses on conclude the indicators that influence a customer's decision to accept an online investment or not. The application requirements focus to improve on the level of recognition among customers; However; Customer behaviour indicators were limited to assessing the

level of customer acceptance of user satisfaction, intent to use in the future, and net benefits while dealing with marketable of smartphone applications. The relationship between these indicators assist to infer each regulation based on a consumer behaviour perspective. The indicators can be defined as follows:

–The evaluation of the consumer behavior's characteristics is presented in the study sample focus on the third element that assist to implement of commercial applications for smartphones. This focused to identify the indicators that influenced the customer's decision whether to buy online or not. Technical application requirements related to improve the level of acceptance among consumers, however consumer behaviour indicators are more related to determining the level of consumer acceptance of user satisfaction, future use intent, and net benefits while dealing with smartphone commercial applications. It has been observed that the linking between all the indicators helps to determine the requirements' need for the study constructs from the consumer behaviour perspective. The indicators can be summarized as follows:

–IU indicators are based to assist the relationships between the intent to use and basic requirements of smart phone commercial applications to conduct the purchasing transactions electronically.

–US indicators are based on the relationship between the US and IU, which indicates the cause of the US on the IU. US indicators determine the information and methods received in smartphone commercial trading application. The US gives the opportunity to increase confidence in regular online purchases through commercial applications in the future.

–Net Benefits offer positive benefits to any person, operator, community or owner of smart application companies. It is possible to determine the level of trust among consumers by implementing commercial applications, thus improving the level of US and IU use in the future.

5. The differences requirements between societies represent one of the main important aspects to determine the specific requirements of each society because these functions concern some segments unlike others. Therefore, it important to place these differences in separate templates that are added into the application according to user requests, or can be activated directly according to current location that is identified by smartphone OS. These differences are addressed in detail in separated research [19].

6. Finally, jobs can be subdivided on the main stakeholders and their decisions regarding the functions' operation. Agencies can design firms, retail firms, or buyers. Regularly functions can be performed by the owners of the application company and influence the design of the system. Social functions such as communication functions can be influenced by

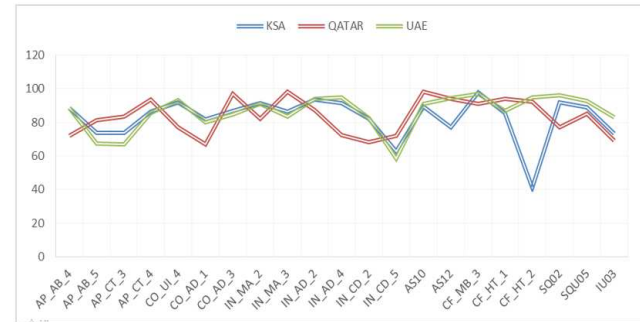customers' decision. All these functions are summarized in Table

Fig. 3: Graph of indicators that show different rates of M-Commerce application requierments in samples

6. IMPLICATION

This study is a mixing between the theoretical and practical research. This section discusses the main linking between the M-commerce literature review and the requirements for commercial applications in smartphones. M-commerce depending on electronic systems and associated research to MIS; Therefore, it is important to explore the implications of theoretical frameworks of this study.

This study will divide the types of ISS models of smartphone commercial applications into the four categories of beliefs, attitudes, behaviour, and habits, which represent the most fundamental aspects of the acceptance of theoretical framework models [20]-[26]. These four variables are similar in many of the theoretical frameworks that concentrate on acceptance and success factors in electronic systems, such as TAM, UTAUT, and ISS models. They differ in how they are applied in these frameworks, yet there are many factors that would be helpful in increasing the level of US, which would lead to re-use [22]-[27]. These factors are determined by target users when evaluating the main benefits of electronic systems [24,27] Users' attitudes toward electronic commercial systems are affected by ease of use and the provision of customers' requirements, which include their satisfaction and Intention to Use the system [23,28]. Customers' ease of use requirements directly affects consumer behaviours due to external variables that affect cultural and traditional differences among communities [20,26,27,29]. The modified ISS models in smartphone commercial applications are obtained from the following categories:

–Beliefs category recognizes utility and diverse customer requirements, including qualities requirements, that is caused to interest to facilitate the Benefit and diverse customer requirements approach

Table 6: M-commerce main function and relevant new groups

	Name of function	Group of	Related code
1.	Design application style functions	Technological Functions	AP02, AP03, AP04, AP11, OR05, & IN07
2.	Designing the application screens functions		AP05, AP07, AP08, & AP09
3.	Entering Data function		OR09
4.	Using the bilateral verification function		AS09
5.	Deleting cookies files of consumers function		AS11
6.	The 'tracking shipping' item function		CF13
7.	Providing an electronic receipt feature function		CF14
8.	Providing audio alert messages functions		IN11 & IN12
9.	Display items/information functions		CO02, CO03, & CO06
10.	Presenting the multimedia (text, video, image, voice) file functions		IN02, IN03, & CO11
11.	Providing a diverse and compatible version of the application in smartphone devices		CF16
12.	Presenting recommended products and offers to the users' functions which include the indicators.	Social Functions	IN08; IN09, & IN10
13.	Determining user's location through a Location Service to present available content based on geographical the location function		CO10
14.	Building customer loyalty functions through periodic rewards programs		CF05 & CF06
15.	Communicating with customers to receive customers' suggestions and opinions about the application performance functions		CF02, CF03, & CF07
16.	Providing functionality that focuses on a 'feedback service'.		AS03
17.	Organising and presenting the information on the application screens functions, which include the indicators.	Organisational Functions	OR04, OR06, OR07, & OR08
18.	Search functions that assist for quick learning of application characteristics, which include the indicators.		CF08, CF09, & CF10
19.	Displaying information of product details and some application policies functions which include the indicators.		CO04, CO05, AS02, AS05, AS06, AS08, AS10, AS12, AS13, CF12, & CO07
20.	Displaying the results horizontally or vertically, which include the indicators.		IN04; IN05, & IN06

[20, 24]. Therefore, the believing of the importance of diverse customer requirements part of the study demonstrates the importance of integrating with the ISS model. Basic customer requirements for business applications in this study represent consumers' beliefs and things that are important to the main target audience. The prerequisites are addressed and identified for implementing business applications consistent with the ambitions and beliefs of the target audience.

– The Attitude category represents users' feedback and their satisfaction level [1, 10, 20, 23, 30]. This category focuses on defining the beliefs of the target audience of smartphone commercial application towards the requirements of commercial applications. Reusing the application might help to determine the level of customer satisfaction by receiving their recommendations and modifying their aspects to increase satisfaction level, thus positively influencing consumers' attitudes towards commercial applications will be increased.

– The behaviors category represents intention to use electronic systems in the future [8, 23, 26, 27]. Consumer behaviors are impacted by the provision of fundamentals requirements for business applications (beliefs), as well as current user satisfaction. The intention to use give users' greater confidence and more flexibility to deal with many business applications that have the same features, although

there are some differences in some main overall design and offered products.

– The habits category includes cultural behaviours that are primary of target audience characteristics regarding the acceptance of online purchase systems in smartphones that will help to increase the participants in the future [22, 23, 25, 28]. Beliefs, attitudes and behaviors need to deal with consumer habits which differ from one society to another. Thus, the characteristics of the target population can be changed depending on the online businesses to discover the characteristics of their target audience, determine how to communicate with them, and use trusted audience to communicate with a wider segment of society later on.

– Thus, the categories of beliefs, attitudes, behaviors and habits present the essential requirements of the ISS model, which draw the roadmap that will help to increase the acceptance level of smartphones commercial applications in the GCC region.

8. LIMITATIONS AND FUTURE RESEARCH

The hypotheses between the framework constructs of this study are written in positive sentences toward the approach of the relationship between the constructs because the M-commerce approach is already adopted globally. However, some of these assumptions may create measurement errors regarding the level of strength or weakness of the relationships between constructs in the model in general, which might affect the structural model

[31]. It becomes essential to determine the relationships in the experimental sample for ensuring the relationship between the constructs in future for assessing the structural model accurately [32].

6 CONCLUSIONS

The importance of this study is presenting the M-commerce as one of the appropriate platforms in online purchasing that is include wide range of commercial applications which working with smartphones operating system. Also, several commercial companies tend to increase their customers in wide geographical area that cannot be reached by physical stores. The conventional communities significantly affect the acceptance level of the consumers to handle the electronic systems widely. Hence, it is essential to re-examine the operational plans that could help in developing different M-commerce applications, based on the requirements of the Arabic and GCC societies. In this study, the researchers have focused on identifying the fundamental requirements of the GCC region, and presenting the particular opinions of the respondents regarding the requirements that must be included for improving the acceptance level of commercial applications among the consumers. It would be useful to focus on indicators that deal with smartphones commercial applications for design M-commerce applications to keep up with the growing demand for M-commerce in the Arab community in the future.
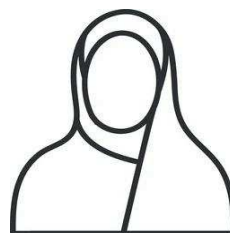
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Thikraa Mohammed Al-Harthi is a Technical Support Specialist at the Deanship of Digital Transformation and Knowledge Resources, Najran University. She holds a B.Sc. in Computer Science (2020) and an M.Sc. in Professional Data Science (2024), both with first honors from Najran University. Her expertise spans machine learning, deep learning, natural language processing, medical data analysis, and educational technology.

Adel Bahaddad: received the B.S. degree in computer science from Science's College, Saudi Arabia, in 2002, and the M.S. and Ph.D. degrees in information and communication technology from the School of Information and Communication Technology, Griffith University, Brisbane, Australia, in 2012 and 2017, respectively. He is currently an Assistant Professor with the Faculty of Computing and Information Technology, King Abdulaziz University (KAU), where he serves Head of the Department of Systems and Educational Programs at the Deanship of E-Learning and Distance Education (Since 2018). He participated in a number of executive committees concerned with automating operations at the Educational Curriculum Center and the Strategic Plan of the Strategic Center to achieve the Kingdom's vision at King Abdulaziz University. His research interest's area includes diffusion and technology adoption and Digital Transformation, M-Service, M-Commerce, LMS, and M-Governances., BYOD And he has many publications in these fields.

Faisal A. Algowter, is a Saudi researcher and a postgraduate student in Data Science, born on August 22, 2000. He holds a bachelor's degree with honors in Computer Science from Najran University and currently works at the Deanship of Digital Transformation at the university. He has expertise in data analysis and programming with Python, along with multiple professional certifications in Data Science. His research focuses on artificial intelligence and big data analytics, aiming to develop innovative solutions that support digital transformation and align with Saudi Vision 2030.

Ali Alshehri is Associate Professor of Computer Science at University of Tabuk, Tabuk, Saudi Arabia. His research interests include Information Security, Web Services, Mobile Security, Network Security, Privacy, Intrusion Detection and Prevention, Cryptography, IoT, Blockchain, and Digital Forensics.

Ibrahim Alkhazi is a lecturer at the College of Computers and Information Technology, University of Tabuk, Saudi Arabia. His primary interests lie in Artificial Intelligence and Natural Language Processing. He is currently involved in several research projects focusing on renewable energy and its applications in Artificial Intelligence.

Wahid Rajeh has received the B.S. degree in computer science from Science's College, Saudi Arabia, in 2002, and the M.S. and Ph.D. degrees in information and communication technology from the School of Information and Communication Technology, Griffith University, Brisbane, Australia, in 2012 and 2017, respectively. He is currently an Assistant Professor with the Faculty of Computing and Information Technology, King Abdulaziz University (KAU), where he serves Head of the Department of Systems and Educational Programs at the Deanship of E-Learning and Distance Education (Since 2018). He participated in a number of executive committees concerned with automating operations at the Educational Curriculum Center and the Strategic Plan of the Strategic Center to achieve the Kingdom's vision at King Abdulaziz University. His research interest's area includes diffusion and technology adoption and Digital Transformation, M-Service, M-Commerce, LMS, and M-Governances., BYOD And he has many publications in these fields.