Examining relationship between service quality, user satisfaction and performance impact in the context of smart government in UAE

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Article Info	ABSTRACT
	Governments attempt to use all forms of information technologies including Internet and mobile computing to be able to transform relationships with citizens. However, there is a clear gap between the indicator of the impact of technology innovation output and government's vision in United Arab Emirates (UAE). In this regard, investigating the relationship between service quality, user satisfaction, and performance impact may help the government to mark its current progress and milestone achievement. This research proposed a model based on Delone & McLean IS success model by considering the research context. The modeling of structural equations via PLS (Partial least squares) regression was applied to evaluate the model within the context of public sector in the UAE. The data was collected from a sample of 147 employees in public organizations using a questionnaire. Results demonstrated that the quality of service has a significant effect on user satisfaction. In addition, quality of service and user satisfaction positively influences the staff performance. The outcome of this research helps to enhance the understanding of the impact of smart government applications.

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1. INTRODUCTION

Internet has rapidly become vital to the majority of our routine activities and has considerably affected every facet of organisational functioning [1]. It plays an important role in the management of information which in turn is used to improve decision making process, quality of communication, efficiency of operations and knowledge acquirement [2-5].

One of the United Arab Emirates (UAE) Vision 2021 pillars is transforming to competitive knowledge economy (innovation, creativity, and financial services) using innovative technologies. Organizational innovation and smart government initiative are drivers of achieving the goal. The current smart and e-governance systems should continuously be evaluated, service delivery quality should be improved, and transparency and accountability of the UAE Government should be enhanced.

The government of UAE emphasizes that it's vision and long-term strategy is to always strive to be number one in the world in all aspects including technology usage. According to Global Innovation Index 2017, UAE is ahead its neighbours in ICT access and innovation output; however, it has some kind of inconsistency between the two indicators where innovation output is significantly low compared to the level of ICT access. The new generation of ICT transforms public services into a Smart Government. The concept

of the 'SMART' stands for the main feature of new technology which is social, mobile, analytics, radical-openness trust [6-12] .

Although innovativeness is being increasingly investigated in the academic literature as an important variable in the context of technology adoption and its impact, there is a clear gap between the indicator of the impact of technology innovation output and UAE government's vision of the future in this regard. More specifically, there is lack of empirical studies examining the relationship between service quality, user satisfaction, and performance impact in the context of smart government in UAE. To be able to reduce this discrepancy, this research addresses the relationship between the quality of service in smart government initiative and users' satisfaction, and the impact of these two factors on the performance of public sector organizations in UAE. The paper is organized so that the proposed model is introduced by identifying the constructs and related hypotheses. Then, the applied research method is described. Next, data analysis and results are reported. Finally, results discussion and conclusion is presented.

2.   THE PROPOSED MODEL

The correlations between the proposed factors are conjectured in a conceptual model based on Delone and McLean IS success model [13]. Figure 1 displays the proposed model which includes service quality, user satisfaction and performance impact. Delone & Mclean developed the information system success model, which known as DMISM, to comprehensively review IS success factors. Six categories of IS success factors were concluded including system quality, information quality, IS use, user satisfaction, individual impact, and organizational impact [6, 14-19]. Then in 2003, the model was updated by the same authors (Delone & Mclean) by including service quality as a new dimension. Further, all impact measurements were grouped into one category called "net benefit", to avoid complicating the model with more success measurements [20-22]. The proposed model examines the correlation between service quality, user satisfaction and performance in the context of smart government services in UAE. Accordingly, the proposed conceptual model has three hypotheses to be tested. The following sub sections define the model constructs and related hypotheses.
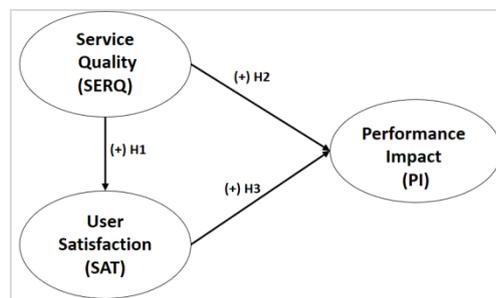

Figure 1. The proposed conceptual model

2.1. Service quality (SERQ)

Service quality means the fulfilment of service provided to meet customer needs, satisfaction and expectations [23]. With reference to the research of IS, in their restructured IS success model, Delone and McLean [24] have defined service quality using these characteristics: reliability, tangibles, assurance, responsiveness, and empathy. Delone & McLean [24] proposed that the service quality stands for user support by the department of IS, and is often assessed by the reliability, responsiveness and empathy [24]. Oktal et al. [25] examined the impact of service quality on user satisfaction as well as the impact of performance and stated its importance on both relationships [25]. As a result, the below hypotheses are proposed:
H1: Service quality significantly influences user satisfaction.
H2: Service quality significantly influences performance impact.

2.2. User satisfaction (SAT)

User satisfaction is considered as one of the central aspects in IS discipline [26-30]. Thus, it has been tested extensively in studying the use of systems and applications [25]. User satisfaction is defined as the attitude of the user towards a computer system/application he interacts with [31]. It is the extent to which the user thinks application/system fulfils his/her requirements. In addition, user satisfaction is considered as

a measure of whether the user thinks that the system is useful and he wishes to use it again [25, 32, 33]. User satisfaction and performance are key constructs of the Delone and McLean IS success model, thus the relationship between these two constructs has been confirmed widely in the literature. Alshamsi, et al., [7] examined and confirmed the significance of the relationship between using smart government services and user satisfaction. As a result, the following hypothesis is proposed:

H3: User satisfaction has a significant influence on performance impact.

2.3. Performance impact (PI)

The performance impact is the definitive measurement regarding the use of an IS, as being a key aspect in the Delone and Mclean IS success model [2]. It has extensively been the focus of several studies in this domain. Aparicio et al., [34] investigated factors that influence the performance impact of using e-learning systems. Furthermore, a study by Tam and Oliveira [35] in Portugal examined the performance impact of using mobile learning.

3. RESEARCH METHOD

The research method for this study involved creating a questionnaire of 13 items. The questionaire items were developed by adapting the orginal measurments from the literature of IS in the context of the study. The questionnaire used Likert scale suggested by [36], and applied in the previous studies in the similar context [20, 32, 37, 38]. The data was collected using a self-managed questionnaire between January 2017 and March 2018. Employees in governmental organisations in UAE were targeded. 200 questionnaires were distrbuted, and 160 were returned. After data screening process, 15 responses were droped. According to Krejcie and Morgan [39] and Tabachnick and Fidell [40], the sample size (145) is sufficient. Structural Equation Modelling-Variance Based (SEM-VB) was used to assess the proposed model by utilising SmartPLS 3.0 [41]. Using PLS, measurement and structural model simultaneously can be analysed which results in more accurate estimates [42]. Table 1 illustrates the demographic data of the respondents.

Table 1. Respondents' profiles

Demographic Item	Categories		Persentage
Do you use e-government services	1.	Yes	100%
	2.	No	0%
Gender	1.	Male	53.1%
	2.	Female	46.9%
Age	1.	24-29 years	15.9
	2.	30-39 years	24.2
	3.	40 and more	59.9
Nationality	1.	Local	62%
	2.	International	38%
Education level	1.	Secondary School	18.4%
	2.	Undergraduate	64.7%
	3.	Postgraduate	16.9%
Occupation	1.	Study or ICT	34.5%
	2.	Work in Services	28.0%
	3.	Work in Planning	22.4%
	4.	Others	15.1%
Online service Access rate	1.	Daily	39.8%
	2.	Weekly	22.9%
	3.	Monthly	24.2%
	4.	Occasionally	13.1%
Session time (in minutes)	1.	0-10	36.3%
	2.	11-20	23.2%
	3.	21-30	15.9%
	4.	> 30	24.7%

4. RESULTS

Based on partial least squares (PLS), two-stage analytical technique; measurement model assessment (verifying the reliability and validityof the instrument) and structural model assessment (examining the hypothesized relationships) was applied after reporting the descriptive results [43]. According to Hair et al., [43], the measurement model examines each construct's scale, and the structural model examines the correlation between the constructs in the model. PLS technique is capable of analysis the structural and measurement model simultaneously with a significant degree of accuracy [14, 44-49].

4.1. Descriptive analysis

Table 2 shows the results of standard deviation (SD) and mean of every parameter scale in the instrument. The respondents were asked to reveal their opinion regarding service quality, user satisfaction, and performance impact based on a 5-point Likert scale varying from 5 (strongly agree) to 1 (strongly disagree). The score of the impact of performance was the highest with 3.263 mean and SD of 1.018.

Table 2. Descriptive results and reliability indicators

Construct	Items	Loading (> 0.5)	Mean	SD	α (> 0.7)	CR (> 0.7)	AVE (> 0.5)
Service Quality (SERQ)	SERQ_1	0.943					
	SERQ_2	0.939	3.189	1.157	0.942	0.963	0.897
	SERQ_3	0.958					
User Satisfaction (SAT)	SAT_1	0.933					
	SAT_2	0.926	3.109	1.107	0.922	0.950	0.865
	SAT_3	0.930					
Performance Impact (PI)	PI_1	0.872					
	PI_2	0.877					
	PI_3	0.909					
	PI_4	0.916	3.263	1.018	0.952	0.962	0.808
	PI_5	0.910					
	PI_6	Deleted					
	PI_7	0.909					

4.2. Assessment of measurement model

Reliability and validity (comprising discriminant and convergent validity) of the constructs' measurments were assessed in this stage. Cronbach alpha (α) was tested to assess the reliability of each construct in the model. The cronbach alpha scores of all constructs ranged from 0.922 to 0.952, which exceeded the satisfaction value of 0.7 [50-52]. In addition, for inspecting the reliability, the composite reliability (CR) values were reported. CR values ranged from 0.950 to 0.963, which also were greater than 0.7 [53-56] in Table 2. Thus, construct reliability has been fulfilled for all constructs. In addition, *indicator reliability* assessment was conducted by examining factor loadings. As per Hair et al. [50], the values exceeding 0.70 suggest substantial factor loadings. Table 1 shows that all items have factor loadings' values greater than the suggested value of 0.7 except PI_6 which was droped from PI scale because of low loading.

For the *convergent validity* assessment, AVE (average variance extracted) was examined. AVE is refered as the degree to which an item is correlated positively with the items in the same construct. All the AVE scores ranged from 0.808 to 0.897, which is beyond the minimum criteria of 0.50 [57]. Thus, all constructs have convergent validity as shown in Table 2.

The degree to which each construct is distinct and captures a phenomenan not represented by other constructs is refered as discriminant validity. Cross-loadings and Fornell-Larcker criterian were used to assess the discriminant validity. Cross-loadings measurement is applied as the initial step in examining discriminant validity [43]. The results show that the items' outer loadings on each construct exceed all the outer loadings with other constructs. This indicates that the cross-loading assessment had met the requirements as shown in Table 3.

Table 3. Constructs'cross loadings

	SERQ	SAT	PI
SERQ_1	.943	.552	.601
SERQ_2	.939	.534	.580
SERQ_3	.958	.541	.578
SAT_1	.547	.933	.625
SAT_2	.509	.926	.588
SAT_3	.541	.930	.590
PI_1	.573	.633	.872
PI_2	.558	.581	.877
PI_3	.566	.548	.909
PI_4	.550	.567	.916
PI_5	.569	.603	.910
PI_7	.517	.545	.909

Key: SERQ: service quality, SAT: user satisfaction, PI: performance impact

Further, for discriminant validity assessment, Fornell-Larcker measurement is applied. The results indicate that √AVE for each construct is greater than the inter-correlations with other constructs as shown in Table 4, which demonstrates that each construct is distinct [58-59]. According to Hair et al., [43], this indicates that all constructs had fulfilled discriminant validity.

Table 4. Fornell-Larcker criterion results

	Factors	1 PI	2 SERQ	3 SAT
1	PI	**0.899**		
2	SERQ	0.619	**0.947**	
3	SAT	0.647	0.573	**0.930**

Note: Highlighted values represent √AVE while the others represent the correlations

4.3. Assessment of structural model

To test the proposed hypotheses, the significance of each path is estimated using a PLS bootstrapping method with 5000 resamples. Verifying the hypotheses involves calculating path coefficients (beta β), its corresponding t-values and R^2 [43]. The value of the β indicates the strengths of relationships between the constructs. In addition, the R^2 value represents the amount of variance explained by independent variables.

Table 5 and Figure 2 illustrate the assessment of structural model representig the results of the hypothesis testing, where all the 3 hypotheses are examined. Service quality considerably predicts user satisfaction. Hence, H1 is supported with ($\beta = 0.573$, t = 15.809, p < 0.001). Service quality and user satisfaction significantly predict performance impact. Hence, H2 and H3 are supported with ($\beta = 0.370$, t = 8.432, p < 0.001) and ($\beta = 0.435$, t = 10.376, p < 0.001), respectively.

The strength of the correlations between the constructs is evaluated by the path coefficients, and in this case, the results demonstrate that the straightforward consequences of user satisfaction on the performance impact are stronger than the effects of quality of service on the performance impact. Furthermore, the R^2 values show adequate level of descriptive power, suggesting a substantial model [60-62].

Table 5. Structural model assessment results

Hypothesis	Relationship	Std Beta	Std Error	t-value	p-value	Decision	R²
H1	SERQ→SAT	0.573	0.036	15.809	0.000	Supported	0.33
H2	SERQ→PI	0.370	0.044	8.432	0.000	Supported	0.51
H3	SAT→ PI	0.435	0.042	10.376	0.000	Supported	

Key: SERQ: service quality, SAT: user satisfaction, PI: performance impact
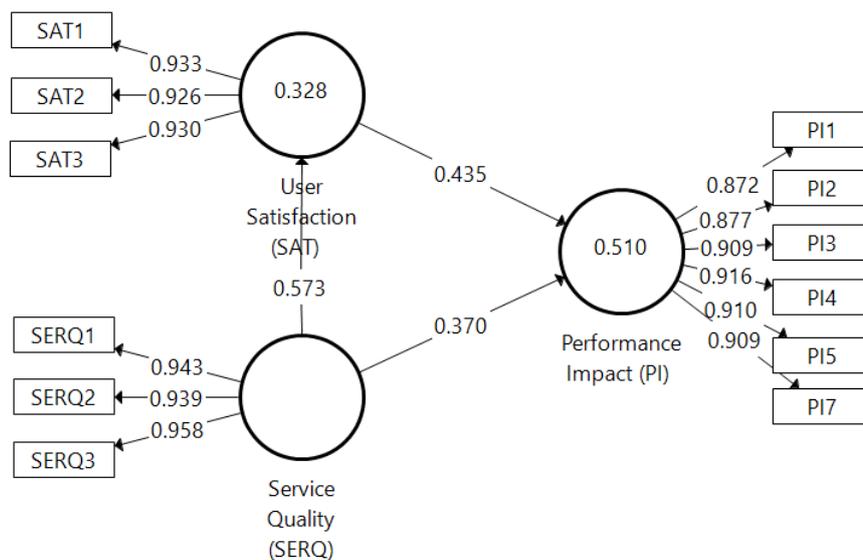

Figure 2. PLS algorithm results

5. DISCUSSION

Service quality was found to positively influences user satisfaction in using smart government services among employees in public sector in the UAE, which is supported by previous studies [6, 19, 20, 38, 63-66]. It is explained by the fact that the more the employee is able to use smart government services at the time or place he/she wants, find platforms that are relevant to his tasks, and is able to communicate interactively through it, the more the employees consider their use of smart government services to be a wise decision, as it meets their expectations, and leaves them feeling generally satisfied.

It was also discovered that the quality of service significantly affected performance impact. This effect, which is supported by past studies [32, 33, 37, 67-69], has been described by the idea that when a staff member of a public sector organisation is able to utilise smart government applications at the place or time he/she wishes, find platforms appropriate for his tasks, and is also able to be in touch interactively using it, then this will bring about a performance enhancement in 3 perspectives: efficiency (complete tasks easily and quickly), knowledge acquisition (acquire new skills and knowledge, generate innovative ideas) and improve communication with clients and employees, besides decision quality and service delivery.

In the long run, user satisfaction was discovered to positively influence the impact of performance of smart government applications among staff members within public sector organisations in the UAE. This effect is supported by the past studies [70-72], and is justified by the fact that when staff members in public sector organisations are already satisfied with the application, it will make a contribution to their performance improvement in 3 perspectives: efficiency, knowledge acquirement and with regards to communication with clients and employees, besides decision quality and service delivery.

6. CONCLUSION

Even though the governmental organisations of UAE are ahead of their regional peers in terms of performance, it is trying hard to enhance the services of its public sector institutions, the results of this research could be regarded as one of the proposals that can be used in this direction. The aim of this research was to test the impact of technology attributes quality of service on user satisfaction as well as impact of performance of smart government applications on the employees in the public sector organisations in the UAE. It has offered a case to authenticate parts of Delone & McLean IS success model and, despite various restrictions faced by the research; it has been able to give an insight into a new context of smart governments. The results revealed that all three hypotheses were significant, and the independent variables significantly explain 51% of performance impact.

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