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Antecedent and Consequence of Internet Usage: An Empirical Study among Government Employees in UAE

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ABSTRACT: The study marks modeling of structural equations through SmartPLS 3.0 for analysing 406 questionnaires in order to assess the model proposed on the basis of Deloneanf Mclean information system model to identify factors affecting internet usage by government in the UAE. All independent model constructs cover the quality of the system, service, and information. The dependent construct is linked with how performance is affected by the usage of internet. It will describe the link among all constructs. The model proposed a difference of 26.8% in the performance.

Keywords: Internet Usage; performance impact; United Arab Emirates.

I. INTRODUCTION

It has become widely agreed that internet technology has a vital role within organizations. Innovations and technological advancement's importance has increased with increase in usage of internet and portable gadgets. Widespread IT all over the world cannot be avoided due to its advantages. Organizations are interested in investing hefty amount on IT for its growth and increase competition leading to benefit [1-3].

Change in IT sector is a major factor that influences the organization and its employees in terms of growth due to increase in competition [4].

Before the organization realizes how beneficial IT is, the users should realize and accept it [5,44,45,46].

The well-known techniques applied for employees' acceptance of technology and the amount invested gives great returns. This study was done to evaluate the factors responsible for usage of internet in the UAE and also to enhance internet's role about how it facilitates transaction of information among levels of management.

According to the Internet World Stats (2017) [6], the UAE comes second in terms of the population percentage that are using the internet with a whopping 90.6% which is considered among the highest in the world. However, figure 1 shows that the UAE is positioned at the tenth place in the world based on how IT has affected the performance of an organization [7].

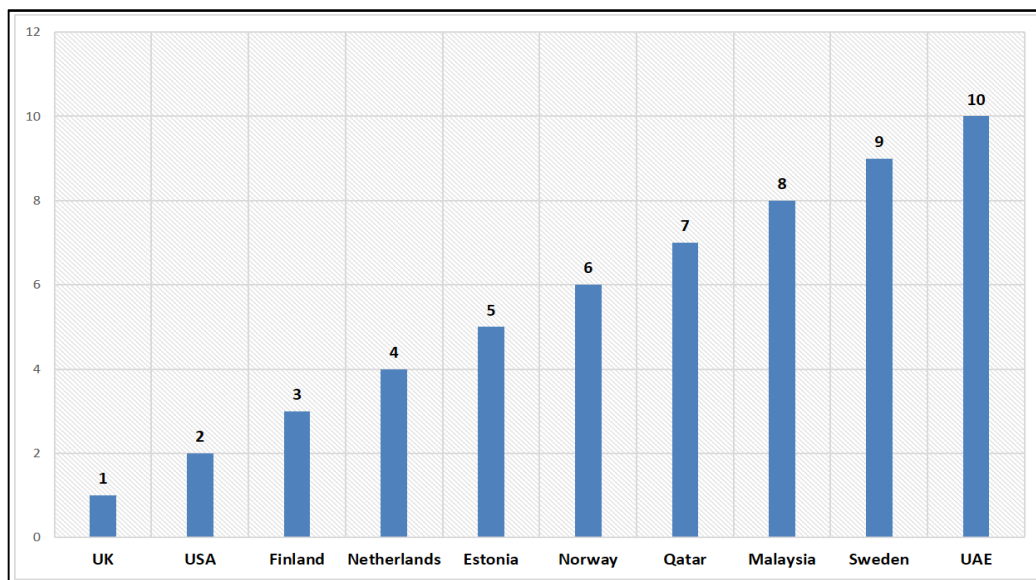


Fig. 1. Impact of technology usage on organizational performance: (Ranking among 139 countries). [7].

In terms of the industrial gap, figure 2 clearly shows that although the UAE comes first or second among 139 countries in most of the ICT indicators, it drops to

the 26th place in the ICT performance impact indicator. This study focuses on identifying reasons that will help the UAE to improve its public sector

performance in terms of utilizing the internet technology and factors if existed that are hindering

any improvement of technology impact on public sector performance.

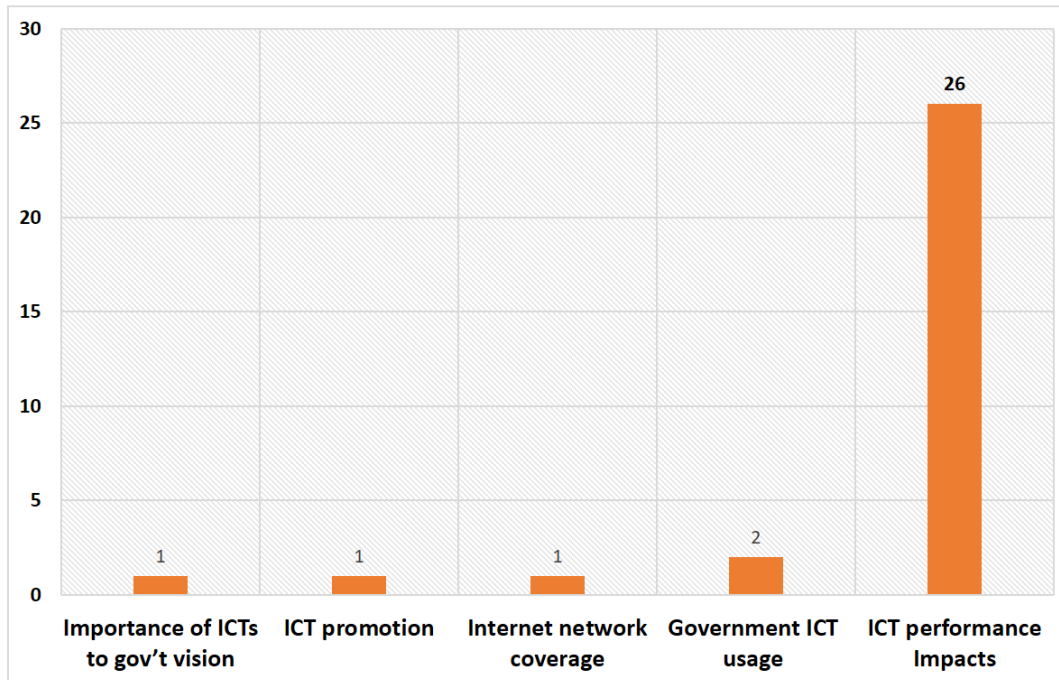


Fig. 2. UAE Ranking among 139 countries regarding ICT issues Source: [7]

II. LITERATURE REVIEW

A. System Quality (SYSQ)

It is described to be how suitable, reliable a system is, and depicts how stable software and hardware are where the information gets its support [8] and as characteristics that the system has on the basis of smooth usage, functioning, flexibility, understandable, and reliability [9]. It is formed in the process how user and system interact [10]. Moreover, the consideration of it as a pillar affecting the satisfaction of user and its use considering it to be of high quality make users satisfied [11]. Additionally, the study mentioned about quality of system of carrying bugs or not and the UI's consistency.

Quality of the system has been the focus of most IS researchers around the world ever since its inception in Delone & Mclean information system success model (1992) and its updated model in 2003 [12]. A lot of researches are done on what role system quality plays in many applications all over the world. In the knowledge management systems context, two studies in Taiwan and Malaysia by Wang & Lai (2014) [13] and Cham *et al.* (2016) [14] respectively, have discovered about system quality being positively linked with satisfaction of user and usage. The below mentioned hypothesis is proposed:

H1. Quality of system has positively impacted actual internet usage.

B. Information Quality (INFQ)

INFQ is stated as characteristics of output of system being accurate, up-to-date, and complete [9], besides relevance, understanding, and accessibility as other characteristics of information quality as described by Tam & Oliveira (2016) [15]. Moreover, when we think of online learning, information quality is sometimes substituted for knowledge quality as suggested by Wu

& Wang (2006) [16] where they are comprised of context, linkage, and content quality. Nevertheless, Wang *et al.* (2014) [17] described quality of information as attributes of instruction framed by the students and their educators. Additionally, other researchers in the internet context have described information quality as being well organized, effectively presented, and useful [18-19].

A lot of researches made investigations about IT's role technology in different applications and different contexts, for instance, a recent study by Dakhan & Akkoyunlu (2016) [20] in Turkey for investigating how quality of information affects usage of system found out about how the constructs are linked. The below mentioned hypothesis is proposed:

H2. Quality of information has positively impacted actual internet usage

C. Service Quality (SERQ)

It is stated as fulfilling the service delivered to meet the needs of customers. [21-22]. In the context of IS research, in their updated model of information system. Delone & McLean [23] have referred to quality of service by tangibility, being reliable, responsive, assured and empathized. Whereas Petter & McLean [9] suggested that service quality represents the support of users by the IS department, and is often measured by the responsiveness, reliability, and empathy. Nevertheless, quality of service in relation with internet encompasses both the responsiveness of the instructor and the technical support provided by the university as illustrated by Freeze *et al.* (2010) [24].

It is third reason in all the constructs of quality. Beside system and information quality, it has been the focus of research in the IS arena all over the world since its inception in Delone & Mclean information system

success model [9] along with its update in the year 2003. With growth in growing number of technology applications with sophisticated and creative functionalities, service quality becomes an indispensable factor for the success of any technology application specifically for internet which the core of this research is. According to Chiu et al.(2016) whose study in Taiwan on cloud e-bookcase system indicated about quality of service and actual usage being linked[25]. The below mentioned hypothesis is proposed: H3. Quality of service has positively impacted actual internet usage

D. Actual Usage (USE)

It is way of utilizing an information system's credibility. Furthermore, actual use is how much an IS is consumed and the output mentioned on the basis of actual usage [9]. Kim et al. (2015) [26] draws a conclusion about it affecting personal performance in M-CRM study in South Korea. The below mentioned hypothesis is proposed:

H4. Actual internet usage has positively impacted performance.

E. Performance Impact (PI)

PI is the ultimate measurement of the use of how IS is used in the Delone & Mclean information system model of success [27], it has widely been the focus of many studies in this field. In a recent study, Aparicio et al. (2017) [28] investigated reasons influencing the individual impact that system of e-learning have, whereas Isaac et al. (2017) [29] gave a try in exploring the antecedents to performance impact when using the internet in the public sector in Yemen. Furthermore, a study by Almarashdeh (2016) [30] in Saudi Arabia examined the net benefit of using learning management systems, besides [26, 31, 32] choose to see whether the personal performance of 217 officers in South Korea will be affected when they use mobile customer relationship system or not recent years; however, age related infertility remains as one of the most difficult challenges [19, 30].

III. RESEARCH METHOD

Female infertility is investigated on hormonal and structural (female reproductive anatomy) or both perspectives. Female infertility may cause because of many reasons but after detail study of female infertility considered factors found major among them corresponding to the hormonal perspective. Succeeding are the eight factors on which female infertility is being investigated Fertility, Age, Menstruation Cycle, BMI, Profile and Radiation OR Stress and Working Environment, Economic, Education and Thyroid (TSH). Data collection method is survey. Total data sample size is 50. Means investigation is done on 50 females, aged between 18-30 yrs.

A. Overview of Research Model

Link between hypotheses of constructs in the framework of concepts are taken from system of information model. Fig 3 shows the model proposed SQ, IQ, SQ and AU to impact of performance. The model proposed assesses the link of the aforementioned constructs among government employees in the United Arab Emirates. The proposed conceptual framework has four hypotheses to be tested.

B. Instrument Development

The instrumental development that this study has included a 22-item questionnaire, and on the basis of IS Literature, it applied a multi-item Likert scale [33].

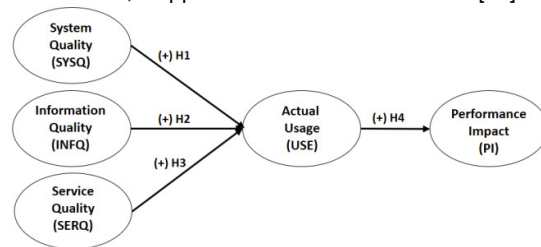


Fig. 2. The proposed model.

Given the fact that the respondents were Arabic-speakers, it is required to have the questionnaires were translated to Arabic. Previous studies validated the measure of variables as shown in Appendix A.

C. Data Collection

Gathered data was scored by delivering a personal questionnaire from October 2017 until March 2018 to government employees. 700 were distributed, and 404 were appropriate out of a response of 448. According to Tabachnick & Fidell (2012) [34] and Krejcie & Morgan (1970) [35], the size of the sample was not insufficient. Compared to the relevant literature the 60.43% the rate of response was taken into consideration. The number of the deleted questionnaires was 42 including a 25 missing data cases, and 6 were outliers, 11 were straight lined.

IV. DATA ANALYSIS AND RESULTS

PLS SEM-VB was used to evaluate the model of research through SmartPLS 3.0 software. It was analyzed by two methods: a) assessment of mm b) assessment of SMMM states the construct measurement, and SM states the link f variable in.

The PLS technique is used for SM and MM because it was able to analyze side-by-side for accurate results [36].

A. Measurement Model Assessment

Methods of validity and reliability were used to examine the model of measurement. Cronbach's alpha coefficients were used to check whether the core variable are reliable or not. All the Cronbach's alpha coefficients' values were from 0.889 to 0.959, which was more than the value of 0.7 as suggested [37]. The values of all the CR were from 0.931 to 0.963, exceeding 0.7 [38-40]. As table 1 shows CR has is as satisfied as Cronbach's Alpha and CR were free of errors.

Indicator reliability was assessed through factor loadings. According to values exceeding 0.50 indicate significant factor loadings. Table 1 presents all the factor loadings were more than the suggested value i.e., 0.5 except items PI7 and PI9, that was removed from the scale due to low loadings.

AVE was put to use for the assessment of Convergent Validity showing a degree measuring positive correlates with measure that were alternative but of the same construct. AVE's values were from 0.766 to 0.849, exceeding the suggested value of 0.50. All constructs are as satisfactory as convergent validity in table 1.

Table 1: Assessment of measurement.

Constructs	Item	Loading (> 0.5)	M	SD	α (> 0.7)	CR (> 0.7)	AVE (> 0.5)
System Quality (SYSQ)	SYSQ1	0.886	3.05	1.10	0.889	0.931	0.818
	SYSQ2	0.906					
	SYSQ3	0.920					
Information Quality (INFQ)	INFQ1	0.912	3.09	1.16	0.895	0.934	0.826
	INFQ2	0.918					
	INFQ3	0.896					
Service Quality (SERQ)	SERQ1	0.923	3.16	1.21	0.911	0.944	0.849
	SERQ2	0.913					
	SERQ3	0.928					
Actual Usage (USE)	USE1	0.879	3.06	1.06	0.895	0.935	0.827
	USE2	0.936					
	USE3	0.912					
Performance Impact (PI)	PI1	0.876	3.11	0.97	0.956	0.963	0.766
	PI2	0.876					
	PI3	0.880					
	PI4	0.864					
	PI5	0.880					
	PI6	0.875					
	PI7	Deleted					
	PI8	0.869					
	PI9	Deleted					
	PI10	0.884					

Note: AVE = Average Variance Extracted, CR = Composite Reliability, α = Cronbach's alpha, SD=Standard Deviation, M=Mean.

Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality.

The extent that each item is distinguished among the constructs is depicted by validity of discriminant. Cross-loadings, Fornell-Larcker, and heterotrait-monotrait ratio (HTMT) were put to use to assess value of discrimination of measurement model. Cross-

loadings are generally put to use to test DV. The outer loadings of the indicators were exceeding all cross loadings therefore, the criterion of cross loading fulfilled the need in table 2

Table 2: Validity via cross-loadings.

	SYSQ	INFQ	SERQ	USE	PI
SYSQ1	0.886	0.513	0.487	0.320	0.480
SYSQ2	0.906	0.538	0.552	0.306	0.503
SYSQ3	0.920	0.564	0.564	0.355	0.547
INFQ1	0.553	0.912	0.623	0.311	0.505
INFQ2	0.554	0.918	0.690	0.341	0.561
INFQ3	0.518	0.896	0.673	0.322	0.537
SERQ1	0.544	0.678	0.923	0.346	0.557
SERQ2	0.557	0.698	0.913	0.334	0.518
SERQ3	0.531	0.637	0.928	0.305	0.510
USE1	0.282	0.273	0.282	0.879	0.421
USE2	0.356	0.326	0.329	0.936	0.501
USE3	0.344	0.370	0.358	0.912	0.485

PI1	0.504	0.505	0.513	0.492	0.876
PI2	0.511	0.535	0.508	0.462	0.880
PI3	0.470	0.531	0.514	0.427	0.864
PI4	0.519	0.548	0.514	0.451	0.880
PI5	0.512	0.534	0.529	0.444	0.875
PI6	0.485	0.466	0.470	0.455	0.869
PI8	0.472	0.492	0.472	0.460	0.884
PI10	0.482	0.515	0.501	0.432	0.876

Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality.

As shown in table 3 AVEs square root on diagonals appear greater than the correlations existing between the constructs that strongly indicate how the constructs and their indicators correlate.. According

to), It is a good value of discriminant validity. The exogenous constructs are correlated at a less value of 0.85. All constructs are as satisfactory as discriminant validity.

Table 3: Validity via Fornell-Larcker criterion.

	Factors	1	2	3	4	5
		USE	INFQ	PI	SERQ	SYSQ
1	USE	0.909				
2	INFQ	0.358	0.909			
3	PI	0.518	0.589	0.875		
4	SERQ	0.357	0.730	0.574	0.921	
5	SYSQ	0.362	0.596	0.565	0.591	0.904

Note: The entire values represent the correlation between variables except the diagonal which represents the square root of AVE

Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality.

Fornell-Larcker criterion has been subjected to debate. because it does not have the ability to determine precisely the discriminant validity's lack in normal situations of research. Therefore, another technique was recommended, namely the heterotrait-monotrait ratio (HTMT) of correlations on the basis of multitrait-multimethod matrix. HTMT has been used to

for testing the validity of discriminant. The DV a few issues in a higher value of the HTMT than the HTMT0.90 value of 0.90 or HTMT0.85 value of 0.85 but as shown in table 4 that all the HTMT values were less than the 0.85, hence fulfilling the discriminant validity requirement.

Table 4: Validity via HTMT.

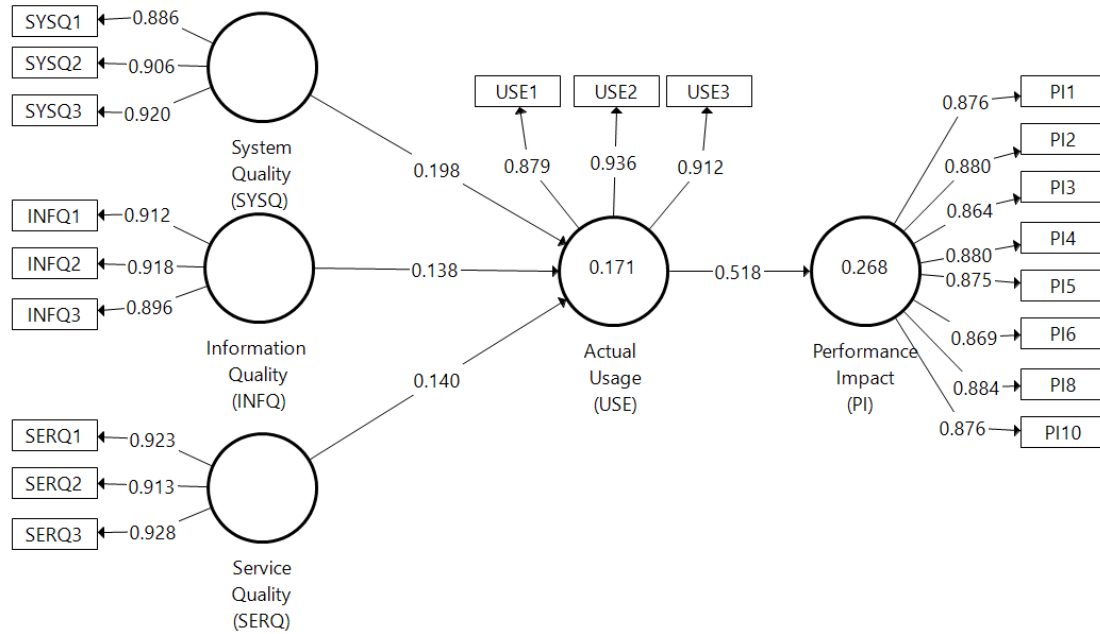
	Factors	1	2	3	4	5
		USE	INFQ	PI	SERQ	SYSQ
1	USE					
2	INFQ	0.396				
3	PI	0.557	0.636			
4	SERQ	0.392	0.806	0.614		
5	SYSQ	0.402	0.667	0.611	0.656	

Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality.

B. Structural Model Assessment

The model of structure can be examined by computing beta (β), R^2 , and the corresponding t-values by a process of bootstrapping with a resample of 5,000. They also recommended looking at the effect sizes (f^2)

and the predictive relevance (Q^2). While p-value makes the existence of the effect certain, the size after effect is not mentioned.



Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality

Fig. 4. PLS algorithm results.

Hypotheses Tests

Figure 4 and Table 5 show SM assessment, showing the results of the hypothesis tests, with 3 out of the 3 hypotheses are supported. SQ, IQ and SQ significantly predict actual use of internet. Hence, H1, H2, and H3 are accepted with ($\beta = 0.198, t = 3.857, p < 0.001$), ($\beta = 0.138, t = 2.081, p < 0.05$), and ($\beta = 0.140, t = 2.019, p < 0.05$) respectively.

The strength of the how exogenous and endogenous constructs are related and are measured by standardised coefficients of path, which in this case show that the direct effects of relational capital on organizational innovation hold more strength than the influence of other variables.

17% of actually used variance of internet is explained by SQ, IQ, and SQ Twenty-seven percent variance of performance impact is explained by actual usage of

internet. The values of R^2 carry an acceptable level of explanatory power, indicating a substantial model. Effect sizes (f^2) was examined in this research. According to, the effect size f^2 ascertains the how exogenous latent construct has impacted endogenous latent construct. Recommendations are that the change in R^2 value is assessed The f^2 value of 0.35 indicates large effects, 0.15 indicates medium effects, and 0.02 indicates small effects Table 5 displays the f^2 results, indicating one medium effect sizes relationships and three small effect size relationship. In assessing the predictive relevance research method that was proposed, this study had applied the blindfolding procedure. This process must be employed on endogenous constructs measurements that only reflect according to and, a specific endogenous construct model proposed with relevance if the value of Q^2 exceeded 0.

Table 5: Assessment of structural model.

Hypothesis	Relationship	Std Beta	Std Error	t-value	p-value	Decision	R^2	f^2	Q^2	VIF
H1	SYSQ → USE	0.198	0.051	3.857	0.000	Supported	0.17	0.028	0.124	1.687
H2	INFQ → USE	0.138	0.066	2.081	0.019	Supported		0.010		2.347
H3	SERQ → USE	0.140	0.069	2.019	0.022	Supported		0.010		2.327
H4	USE → PI	0.518	0.041	12.670	0.000	Supported	0.27	0.367	0.189	1.000

Key: PI: performance impact, USE: actual usage, SERQ: service quality, INFQ: information quality, SYSQ: system quality

In this study, the Q^2 value was greater than 0, and hence, conclusion can be drawn that the model proposed is relevant. Relative measure that is relevant is indicated by Q^2 values of 0.35 for large, 0.15 for medium, and 0.02 for small. The exogenous construct in this study was found to have large predictive relevance. According to multicollinearity poses a problem by presenting overlapping variance. Therefore, it cannot justify each variance in the endogenous variable. VIF issued as a measurement of the multicollinearity degree. A value that exceeds 10 for the biggest VIF depicts an issue. Meanwhile, recommended if a value exceeds 5 for the largest VIF, then it depicts a multicollinearity issue. The VIF here is from 1.000 to 2.347.

Importance-Performance Map Analysis (IPMA)

IPMA was employed as a post-hoc PLS method, along with organizational innovation used as an

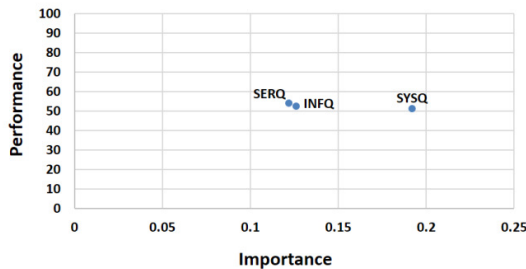
outcome. According to, the IPMA provides an estimation of the total effects corresponding to the importance of constructs that come after and affect the target construct (organizational innovation); the ALV scores correspond to their performance, whereas the index values' (performance scores) calculation was achieved by rescaling the scores of the latent constructs to within a range from 0 (lowest performance) to 100 (highest performance). IMPA makes the results of PLS analysis more prominent as it gives attention to the average latent constructs value and their indicators (the performance dimension) additionally performs the path analysis of coefficient (the importance dimension). The IMPA's results for all the effects and values of index of the outcome construct organizational innovations displayed in Tables 6.

Table 6: IPMA for actual usage of Internet.

Latent constructs	Total effect of the construct <i>actual usage of Internet</i> (Importance)	Index values (Performance)
System Quality	0.192	51.134
Information Quality	0.126	52.344
Service Quality	0.122	54.047

Total values and effects were mapped on a priority basis. It can be observed that relational capital is an important factor that determines the organizational innovation because of its high importance.

There is gap between all the importance of factors determine organizational innovation, having similar performances. IMPA aims to recognize the predecessors having both high as well as low performance for the target construct. Particular attention may be given to the attributes of these constructs, which can be potential areas for improvement. Ultimately, for improving organizational innovation. The focus should be on ways to enhance how relational capital.



Key: SERQ: service quality, INFQ: information quality, SYSQ: system quality

Fig. 5. Priority Map (IPMA) for actual usage of internet.

V. DISCUSSION

On the basis of proposed model, the study makes an improvisation in understanding the role of characteristic of technology of SQ, IQ, and SQ of actual internet usage predicting impact of performance of employees in UAE. It was found in the system quality positively affects actually used internet by employees in UAE. IQ also affects the actually used internet by employees in UAE. Service quality affects actually used internet by employees in UAE. This depicts the feasible use of internet at any time and

place. Ultimate founding was that actual internet usage impacts the impact of performance. The more frequent the usage of internet is, communication gets feasible. It improves communication, gives birth to innovative ideas, and skills and knowledge increase too.

VI. IMPLICATIONS, LIMITATIONS AND FUTURE DIRECTIONS

The main findings have are beneficial for people in UAE on using the IT. Some practical findings were observed like promotion of employees for using internet and to improve them professionally, for development professionally, and work quality. This will encourage the use of internet in the UAE. People researching in the future can make use of performance of organization on the basis of output. And can also evaluate if the effect of demographic reasons are moderate. In spite of being a costly research, this could provide good results about influence of technological advancements on internet usage.

VII. CONCLUSION

Although the UAE government institutions lie steps forward from all others on performance basis, in order to highlight the productivity of public organizations, it is working hard. These findings are some ways that can be used to do show the influencing internet's use and how it impacts UAE. It mainly aims at determining reason Irrespective of restrictions, it resulted in highlighting the fresh ideas and opinions. It validated the Delone & Mclean information system model of success, including SQ, IQ and SQ which were independent variables to actual usage which influences performance impact the variables that are dependent. As shown in the results that all hypotheses are not insignificant. The independent variables significantly explain 26.8% of organizational performance

Appendix A
Instrument for variables

Variable	Measure	Source
System Quality (SYSQ)	SYSQ1: I find the internet to be easy to use. SYSQ2: I find the internet to be flexible to interact with. SYSQ3: My interaction with the internet is clear and understandable.	[41]
Information Quality (INFQ)	INFQ1: The Internet provides up-to-date information. INFQ2: The Internet provides accurate information. INFQ3: The Internet provides relevant information.	[42]
Service Quality (SERQ)	SERQ1: I could use the internet services at any time, anywhere I want. SERQ2: The internet system offers multimedia (audio, video, and text) types of course content. SERQ3: The internet system enables interactive communication.	[42]
Actual Usage (USE)	USE1: I regularly use the internet. USE2: I prefer the communication through the internet. USE3: I promote the use of the internet to my colleagues.	[42]
Performance Impact (PI)	PI1: The internet helps me to accomplish my tasks easily and quickly. PI2: The internet helps me acquire new knowledge and skills PI3: The internet helps me to come up with innovative ideas. PI4: The use of the internet improves communication among employees. PI5: The use of the internet improves communication between the employees and the clients. PI6: The use of the internet improves the delivery of service. PI7: The internet helps me identify potential problems faster. PI8: The internet helps me involve others in making decisions. PI9: The internet helps me make higher quality decisions. PI10: The internet helps to share my general knowledge.	[43]

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