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Evaluating Facebook success in Iraq: An extension of the DeLone and McLean's model of information systems success (ISS)

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Evaluating Facebook success in Iraq: An extension of the DeLone and McLean's model of information systems success (ISS)

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Abstract. With the continuous improvement in Internet and World Wide Web (WWW) technologies, people are increasingly using social network sites (SNS) such as Facebook. SNS has many different implications for individuals, societies, and organizations. Hence, it is important to evaluate the success of such technologies from the users' point of view. This research represents one of the first empirical evaluations of Facebook success based on an extended Delone and Mclean's information systems success (ISS) model in Iraq. The proposed model includes eight constructs namely, information quality, system quality, service quality, intrinsic motivation, perceived interaction, Facebook use, user satisfaction, and net benefits. The validity and reliability of the research instrument used to collect the research data was confirmed first. Accordingly, the partial least squares-structural equation modeling technique (PLS-SEM) was performed on data gathered from 369 Facebook users. This method is useful in identifying the association between different variables as well as the prediction ability of independent on dependent constructs. The findings show that nine out of thirteen hypothesized associations were upheld. These outcomes provide significant implications for both practice and theory.

Keywords. DeLone and McLean's model, Facebook success, intrinsic motivation, perceived interaction, Middle East, Iraq

1. Introduction

Although several different social network sites (SNS) are proposed, Facebook is one of the most used platforms [1]. According to a statistical report, about 2.13 billion active users are using Facebook as of the end of 2017 [2]. The key features of Facebook are: (1) users can create private or public accounts, (2) it is possible for users to find other people easily, (3) personal connections can be tracked in the network [3]. Recently, users demanded better services through SNS. As companies, organizations and individuals provide many different services via SNS such as entertainment, online business, and distance education, though the key focus of SNS is on developing anywhere and anytime communication services.

In the Arab world, SNS played a major role in what is called the Arab Spring revolutions. According to Howard et al. [4], "social media was used heavily to conduct political conversations…in the revolution, young, urban, relatively well-educated individuals, many of whom were women…these individuals used Facebook, Twitter, and YouTube" (p.2). In the case of Iraq, there are currently about

14 million users by 31 December 2017 [5]. Such technologies, however, were developed in the West in which people's culture, values, and perspectives are completely different from those in the Arab world, given the global impact of these sites. There is, therefore, a need for assessing the effectiveness of SNS in the Arab nations, due to the scarcity of research focusing on users' attitudes towards such technologies in these countries [6][7]. This evaluation can assist SNS companies to ascertain whether their services are capable to meet users' needs and assess the effectiveness of their sites in other cultures. To meet these objectives, there is a disputable need to understand the variables that best assess Facebook success. Even though information systems success (ISS) has been evaluated in information systems (IS) research, it is a complex topic and the question of which variables can best measure applications' success is still open [1].

The rest of this paper is structured as follows. First, it reviews the development of the D&M model and provides the theoretical conceptualization of the proposed model. Another section presents the methods adopted to collect the research data and analysis techniques. Then, the key findings including descriptive statistics, the validity of the measurement and the structural model are shown. Subsequently, the research results are discussed and connected with previous literature. Finally, the study concludes its main outcomes, highlights the research limitations and sheds some light on possible future directions.

2. The theoretical model

The D&M ISS model was proposed in 1992 first [8]. It hypothesizes an association between six constructs, namely information quality, system quality, IS use, perceived satisfaction, user impact and finally, organization impact. In 2003, Delone and Mclean updated their model adding a new variable called "service quality" [9]. This new model has been successfully validated with many Web-based technologies such as Facebook [10] and e-government [11]. Figure 1 depicts the traditional D&M ISS model.

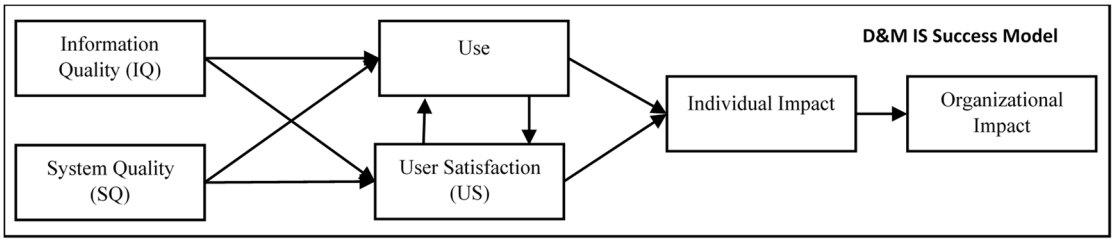


Figure 1. The M&D information systems success (ISS) model [8]

The core categories identified in the D&M model are discussed here. First, it is pointed out that the better "system quality" can improve system use and user satisfaction and this can have a positive effect on the users' productivity [9]. System quality can be identified based on reliability, accessibility, ease of use, and functionality. Second, it is argued that a higher system's objectivity can be obtained if a high level of information and content quality is provided. Hence, it is suggested that "information quality" has a positive influence on system use and user satisfaction. This measurement of this factor is based on information accuracy, accessibility, context and relevancy, and timeliness [10]. Additionally, Delone & Mclean [9] pointed out that "service quality" should be separately measured as an independent variable and it is not a subset of system quality. Fourth, DeLone & Mclean [12] discuss the importance of "user satisfaction". It is defined as users' perspectives regarding a particular application or system that meets their individual information needs [10]. Finally, "system actual use" is proposed as highly affected by system, service and information quality and it is a direct determinant of user satisfaction and net benefits [9].

In the present research, two variables are added to the D&M model which are intrinsic motivation and perceived interaction. In this context, intrinsic motivation is defined as the hedonic fun and enjoyment users perceive when they come to use Facebook. According to previous literature, intrinsic motivation plays a significant role in the adoption of information systems [13]. Therefore, it is suggested here that this variable can affect both Facebook use and perceived satisfaction. Furthermore, SNS plays a key role in enhancing people's interaction and communication. Previous research proposes that

perceived interaction can positively affect user satisfaction [14]. Based on this discussion, the following hypotheses are suggested:

H1: Information quality significantly affects Facebook use.
H2: Information quality significantly affects Facebook user satisfaction.
H3: System quality significantly affects Facebook use.
H4: System quality significantly affects Facebook user satisfaction.
H5: Service quality significantly affects Facebook use.
H6: Service quality significantly affects Facebook user satisfaction.
H7: Intrinsic motivation significantly affects Facebook use.
H8: Intrinsic motivation significantly affects Facebook user satisfaction.
H9: Perceived interaction significantly affects Facebook use.
H10: Perceived interaction significantly affects Facebook user satisfaction.
H11: Use significantly affects Facebook user satisfaction.
H12: Use significantly affects Net benefits.
H13: User satisfaction significantly affects Net benefits.

Figure 2 illustrates the proposed conceptual model.

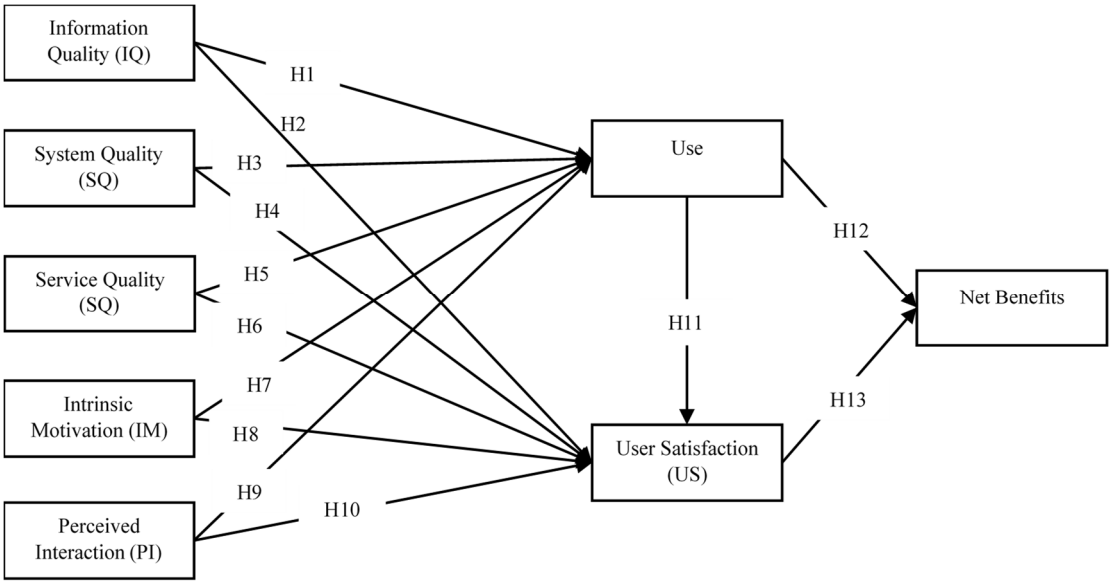


Figure 2. The proposed conceptual model.

3. Research methods

The positivism research paradigm is adopted in this study because it is the most appropriate paradigm in a case of investigating a phenomenon objectively [15]. Hence, the survey research design is implemented to measure the cause and effect associations between the extended D&M model as it is an effective method in such a case [16]. This work seeks to answer two key questions:

1- Can the D&M model be successfully implemented to assess Facebook success in different contexts?
2- Can the explanatory power of the D&M model be improved by integrating perceived interaction and intrinsic motivation variables?

Based on these questions, a survey was designed to collect the research data. Then, a structural equation model technique was carried out to measure the relationships between the paths proposed in the conceptual model.

3.1. Data gathering and sampling

This study targets Facebook users, currently the most popular SNS in Iraq. A paper-based questionnaire was adapted to collect the research data because it can be used to call for a high number of subjects. The questionnaires were distributed in January 2018 and the data gathering required approximately three weeks. This method yielded 369 valid responses out of about 500 surveys distributed, providing a response rate of 73.8%. All items in the survey were based on a five-point Likert scale ranging from one for "strongly disagree" to five for "strongly agree".

The research subjects include 48.8% males and 51.2% females. Their ages ranged from 18-30 (68.6%) to more than 30 years old (31.4%). The educational background of participants was categorized into less than bachelor (48.5%) and bachelor or higher level (51.2%). From the participants, 26.0% were employees and 73.7% were not. Regarding their Facebook experience, 50.1% pointed out that they had low experience level on Facebook, whereas 49.9% expressed their experience as high. Table 1 summarises the demographic profile of the participants.

Table 1. Users' demographic information.

Measure	Items	Number	Percentage (%)
Gender	Male	180	48.8
	Female	189	51.2
Age group	Less or equal 30	253	68.6
	More than 30	116	31.4
Facebook experience	More Experience	185	50.1
	Less Experience	184	49.9
Academic qualification	Less than BSc	179	48.5
	BSc or higher	189	51.2
Job-status	Employee	96	26
	Not employee	184	49.9

3.2. The survey development

The research survey was established based on previous literature, but it has been adapted to suit the purposes of this study and the context of social media networks. Earlier literature has measured the categories identified in the D&M model [17][10][18].

The survey encompassed items measuring eight variables. First, the net benefits construct included four items adapted from [19]. The Facebook use factor originally contained three items modified from [20], but one item was omitted because of its weak loading. The other variable is user satisfaction which included four items adapted from [21]. Moreover, system quality encompassed four items where two were excluded due to their weak loading. The information quality factor contained five items, but two were deleted during the model measurement. Service quality included four items in which one was excluded from the analysis. These three constructs (system quality, information quality, and service quality) were modified from [22]. Additionally, the intrinsic motivation variable which was modified from [23], included six items of which two were deleted because of their weak loading. Finally, perceived interaction contained four items adapted from [14]. The research measurement, scale means, standard deviation, and items outer loading are provided in Appendix A.

4. Results

The extended D&M model was assessed using the partial least square technique as one of the strongest methods in measuring the cause and effect associations between a research model constructs [24]. In the first step, the measurement characteristics including the convergent and discriminant validity were evaluated. Then, the structural model and its associations were assessed.

4.1. The measurement validity

Table 2 lists Cronbach's alpha, composite reliability (CR), average variance extracted (AVE) and discriminant validity of the research measurement. Cronbach's alpha evaluates internal consistency reliability where the recommended value is 0.7 or higher [25]. Its values ranged from 0.738 (for

information quality) to 0.845 (for Facebook use). Findings also illustrate that the square associations for each variable in the survey are less than the variance extracted by the items measuring that variable, meaning that the discriminant validity is adequate. As shown in Table 2, the values of both CR and AVE have exceeded the recommended thresholds of 0.7 and 0.5 for both respectively [26]. The factor loading of all items exceeds the benchmark of 0.7 (see Appendix A). Thus, the overall features of the survey are supported.

Table 2. The measurement convergent and discriminant validity.

	Cronbach's Alpha	CR	AVE	IQ	IM	NetB	PI	SyQ	SQ	Use	US
IQ	0.738	0.850	0.656	0.810							
IM	0.759	0.847	0.581	0.365	0.762						
NetB	0.795	0.867	0.621	0.268	0.263	0.788					
PI	0.748	0.840	0.569	0.302	0.387	0.260	0.754				
SyQ	0.749	0.888	0.798	0.299	0.374	0.403	0.305	0.894			
SQ	0.799	0.882	0.713	0.423	0.470	0.346	0.313	0.483	0.845		
Use	0.845	0.928	0.866	0.183	0.466	0.264	0.290	0.348	0.317	0.931	
US	0.797	0.867	0.621	0.389	0.386	0.528	0.384	0.515	0.443	0.347	0.788

Notes: IQ: Information Quality**, SyQ:** System Quality, **SQ:** Service Quality, **IM:** Intrinsic Motivation, **PI:** Perceived Interaction, **US:** User Satisfaction, **NetB:** Net Benefits

4.2. The structural modeling of the D&M model

To achieve the first objective of this research, the D&M model was measured first without including the other constructs extended in the proposed model. The results of the standardized path coefficient for the D&M model are depicted in Table 3. All D&M original hypotheses were supported, except for the path of information quality to Facebook use.

To begin with, information quality was not related to Facebook use, but it was a significant predictor of user satisfaction (β=-0.030; p=0.594, β=0.199; p<0.001). Second, system quality was significantly associated with both Facebook use and user satisfaction (β=0.251; p<0.001, β=0.331; p<0.001). Third, service quality was related to Facebook use and user satisfaction (β=0.183; p<0.01, β=0.152; p<0.01). Moreover, Facebook use was a significant predictor of user satisfaction (β=0.148; p<0.01). These constructs explained 15.5% (R^2=0.155) and 36.6% (R^2=0.366) of Facebook use and user satisfaction respectively. Finally, both Facebook use and user satisfaction were significant determinates of net benefits (β=0.092; p=0.05, β=0.496; p<0.001), explaining 28.7% (R^2=0.287) of its variance.

Table 3. The D&M structural model findings.

	Path coefficient (β)	T-value	P Values	Findings
Information Quality -> Use	0.030	0.532	0.594	Rejected
Information Quality -> User Satisfaction	0.199	3.966	0.000	Supported
System Quality -> Use	0.251	4.467	0.000	Supported
System Quality -> User Satisfaction	0.331	6.353	0.000	Supported
Service Quality -> Use	0.183	3.085	0.002	Supported
Service Quality -> User Satisfaction	0.152	2.784	0.005	Supported

Use -> Net Benefits	0.092	1.961	0.050	Supported
Use -> User Satisfaction	0.148	3.125	0.002	Supported
User Satisfaction -> Net Benefits	0.496	9.049	0.000	Supported

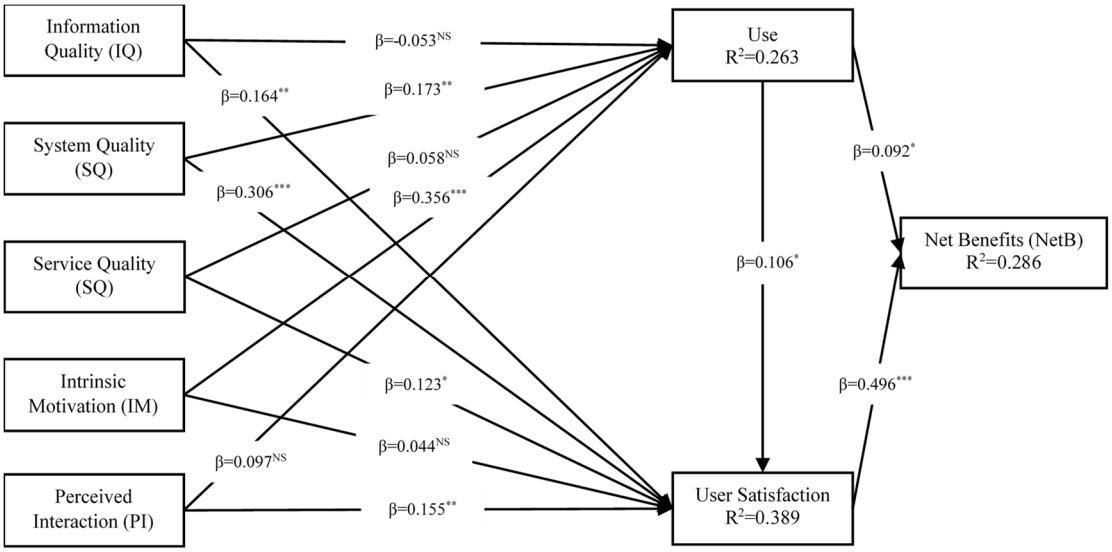
4.3. The structural modeling of the proposed conceptual framework

The findings of the standardized path coefficient for the proposed research framework are illustrated in Table 4 and Figure 3. Out of thirteen paths suggested, nine were significant in the hypothesized directions. First, information quality was not related to Facebook use, but it was a determinant of user satisfaction (β=-0.053; p=0.37, β=0.164; p<0.01). Thus, H1 was rejected, whereas H2 was supported. Furthermore, system quality was significantly associated with both Facebook use and user satisfaction (β=0.173; p<0.01, β=0.306; p<0.001), supporting hypotheses H3 and H4. Third, service quality was not a predictor of Facebook use, but it was related to user satisfaction (β=0.058; p=0.37, β=0.123; p<0.05), rejecting H5 and confirming H6. Moreover, intrinsic motivation was a significant determinant of Facebook use, whereas it had a limited effect on user satisfaction (β=0.356; p<0.001, β=0.044; p=0.407). Hence, H7 was supported, but H8 was not. Fifth, perceived interaction was a weak predictor of Facebook use, though it was a strong determinant of user satisfaction (β=0.097; p=0.094, β=0.155; p<0.01), not providing support for H9, but confirming H10. Sixth, Facebook use had a positive and significant association with user satisfaction (β=0.106; p=0.04), confirming H11. Finally, the findings show that both Facebook use and user satisfaction were significantly associated with net benefits (β=0.092; p=0.05, β=0.496; p<0.001), providing support for H12 and H13. Based on this analysis, the extended model contributed to the enhancement of the explanatory power of the D&M model in assessing Facebook success.

Table 4. The structural model findings.

Path	Path coefficient (β)	P-value	t-value	Findings
H1: IQ→Use	-0.053	0.378	0.882	Not Supported
H2: IQ→User Satisfaction	0.164	<0.01	3.397	Supported
H3: SyQ→Use	0.173	<0.01	3.086	Supported
H4: SyQ→ User Satisfaction	0.306	<0.001	5.803	Supported
H5: SQ→Use	0.058	0.377	0.883	Not Supported
H6: SQ→ User Satisfaction	0.123	0.026	2.230	Supported
H7: IM→Use	0.356	<0.001	5.787	Supported
H8: IM→ User Satisfaction	0.044	0.407	0.830	Not Supported
H9: PI→Use	0.097	0.094	1.675	Not Supported
H10: PI→ User Satisfaction	0.155	<0.01	2.949	Supported
H11: Use→ User Satisfaction	0.106	0.04	2.052	Supported
H12: Use→NetB	0.092	0.05	1.957	Supported
H13: User Satisfaction →NetB	0.496	<0.001	9.086	Supported

Notes: IQ: Information Quality**, SyQ:** System Quality, **SQ:** Service Quality, **IM:** Intrinsic Motivation, **PI:** Perceived Interaction, **US:** User Satisfaction, **NetB:** Net Benefits



*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
***. Correlation is significant at the 0.01 level (2-tailed).

Figure 3. The structural model findings.

5. Discussion

The aim of this research was to establish an understanding of variables influencing Facebook use and user satisfaction regarding the net benefits of SNS. It was grounded on the D&M model to measure its ability in assessing Facebook success in Iraq as well as extending it to improve its overall explanatory power. The findings indicated the following.

Regarding the first objective, the D&M model has been successfully implemented, supporting its validity in different cultural contexts and with a wide range of information systems. These findings are in agreement with a study performed by [10] that investigated the success of Facebook in Taiwan. The significant influence of service quality as shown in Table 3 and Table 4 also confirms the findings of [27] which indicate that this variable can play a key role in Facebook success. The outcomes of [18] support the overall predictability of the D&M model to assess the success of e-learning technology to be consistent with our findings. Thus, the first objective of the research was met. This means that SNS should adopt methods of improving the qualities of the system, information, and services since these variables have significantly improved Facebook use, user satisfaction, and net benefits. Moreover, social media networks should consider the importance of the timeliness, accuracy, usefulness, relevance, reliability, and completeness of information and services provided on the applications.

Pertaining to the second objective, findings of the empirical analysis showed that intrinsic motivation and perceived interaction had a strong and significant effect on Facebook use and user satisfaction. Furthermore, integrating them with the D&M model has improved the explanatory power of the model. For instance, the variance explained for Facebook Use was enhanced from 15.5% to 26.3% and user satisfaction was improved from 36.6% to 38.9%. Thus, system designers and organizations who adopt SNS for their individual services should pay further attention to improve the interaction methods with their users or customers as well as seeking for methods to motivate and enjoy users while they are interacting with these websites. Such results confirm our assumption about the key role of interaction and enjoyment in using social networks. In line with such outcomes, previous research also supports the significant role of interaction methods and intrinsic motivation on users' willingness to accept a technology [28][29]. Hence, the three characteristics of information systems (e.g., system quality, information quality and service quality), users' perceptions and beliefs (e.g., intrinsic motivation and perceived interaction), as well as technology use and user satisfaction, are significantly related to the net benefits of SNS. These results support our extended model in improving the prediction ability of

Facebook success. Furthermore, such findings may represent an indication that the D&M model needs to be extended in empirical research to improve its explanatory power, though its original hypotheses were supported here.

This study has many implications for both practitioners and researchers. For the former, the findings cast light on some significant issues related to the determination of social media networks success that has not been previously tackled in respective research. First, although previous literature on SNS has considered the significant role of D&M variables, this research shows that intrinsic motivation and perceived interaction are other important determinants of the actual use of SNS and user satisfaction. For instance, a social media network provides a high level of communication and interaction (e.g., instant-messenger) or has services for fun and enjoyment (e.g., Happy Farm) can increase the actual use and perceived satisfaction of its users and this, in turn, can lead to better net benefits. This may mean that users' perceptions and psychological factors such as intrinsic motivation are more important in SNS success rather than the technical variables or systems' characteristics only. This research also supports the previous literature that the websites' developers should focus more on improving the features and characteristics of such information systems. This is because these variables are determinants of both actual use and user satisfaction and, thus, can lead to yielding the advantages and benefits of such social networks. For academic researchers, the results show that the D&M model is an effective and useful framework for measuring the success of SNS regardless of cultural differences. Although the model has been previously applied in investigating the success of IS applications, it seems also an effective framework for social websites such as Facebook.

6. Conclusion

Based on the authors' knowledge, this research is one of the first to add empirical outcomes about the influence of the D&M information systems success model on social media networks in Iraq. The study offers a sophisticated view to researchers and practitioners. It was also found that the updated D&M model features (e.g., service quality) and the extended constructs (perceived interaction and intrinsic motivation) had a significant effect on Facebook success. Such results might support the strong impacts of psychological variables on system success more than technical constructs.

Regardless of the research significance, it is not without limitations. The research data were collected at one time, whereas a longitudinal study can be more reliable. Another limitation is that the research findings were based on the viewpoint of Iraqi Facebook users only. As such, they cannot be generalized for other users from different backgrounds and cultures. Finally, the overall explanatory power of the proposed model may suggest including other constructs to enhance its prediction ability. Further research efforts should measure other constructs such as social norm, trust and facilitating conditions to understand the determinants of SNS success. Such issues may invite further empirical work addressing them and validating our extended model.

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Appendix A: The research survey, mean, standard deviation and items loading

Item	M	SD	Outer Loading
System Quality (SyQ)	**3.779**	**0.766**	0.913
SyQ1. Facebook is user-friendly			0.874
SyQ2. Facebook provides interactive features between users and the system			
Service Quality (SQ)	**3.663**	**0.740**	
SQ1. Facebook provides a proper online assistance and explanation			0.848
SQ2. Facebook provides me with the opportunity of reflecting views			0.843
SQ3. Facebook provides me with services management			0.843
Information Quality (IQ)	**3.370**	**0.819**	
IQ1. Facebook provides information that is exactly what I want			0.801
IQ2. Facebook provides me with organized content and information			0.873
IQ3. Facebook provides up to date content and information			0.750
Intrinsic Motivation (IM)	**3.371**	**0.773**	
IM1. Using Facebook gives fun to me			0.814
IM2. Using Facebook stimulates my curiosity			0.766
IM3. Using Facebook leads to my exploration			0.712
IM4. Using Facebook keeps me happy			0.753
Perceived Interaction (PI)	**3.628**	**0.712**	
PI1. Person-to-person interaction is easier on Facebook than in other social networks			0.751
PI2. Interacting with other people using Facebook became more natural			0.780
PI3. It is easy to follow people discussions on Facebook			0.779
PI4. I feel that the quality of discussions is high throughout Facebook			0.704
Facebook Use (FU)	**3.506**	**1.141**	
FU1. I use Facebook on a daily basis			0.926
FU2. I use Facebook frequently			0.935
User Satisfaction (US)	**3.859**	**0.661**	
US1. I am satisfied with using Facebook as a communication assisted tool			0.785
US2. I am satisfied with using Facebook functions			0.802
US3. I am satisfied with my decision to use Facebook			0.838
US4. I feel that Facebook served my needs well			0.723
Net Benefits (NetB)	**3.817**	**0.630**	

NetB1. I believe Facebook is a useful communication tool	0.827
NetB2. I believe that the communication via Facebook is useful	0.850
NetB3. I believe Facebook improves interaction with other people	0.715
NetB4. I believe Facebook is useful	0.752