THE DETERMINANTS OF USER SATISFACTION OF ENGINEERING MAINTENANCE SYSTEM (EMESYS) IN THE MALAYSIAN ARMY

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Abstract

Engineering Maintenance System (EMESYS) is the online Management Information System (MIS) on equipment maintenance performed by the Royal Electrical and Mechanical Engineers (REME) Corps including maintenance on vehicle, weapon, electronic and miscellaneous equipment. This study attempts to identify the determinants of user satisfaction in adopting the EMESYS based on an information system success model by De Lone and Mc Lean (2003). This study is important as it is the first empirical study focusing on the user satisfaction of EMESYS in the context of the Malaysian Army. The data were collected using online surveys from 309 EMESYS users. Standard multiple regressions was used to analyse the data gathered. The results of this study indicate that three of the hypothesis are supported and users' satisfaction of EMESYS is influenced by the three dimensions, namely, system quality, information quality and IT infrastructure. EMESYS has been proven successful in transforming the tedious procedures involving multiple parties and documents to the process of a simple data entry to EMESYS.

keywords: Engineering Maintenance System (EMESYS), Management Information System (MIS), System Quality, Information quality and IT infrastructure.

1. Introduction

It is essential to evaluate Information Systems (IS) performances by measuring user satisfaction to ensure that a particular system is successful, effective and performing well. According to Boudreau & Robey (2005), systems that are made compulsory to userslack flexibility. Researchers have agreed that most IS were unsuccessful in fulfilling their purposes, not merely due to technical problems, but largely due to psychological and organisational matters that do not receive sufficient treatment during the development, implementation and usage of the system (Franklin, Pain, Green, & Owen, 1992). Another argument stated that the users of the system were unhappy and reluctant to use the existing systems which may often overturn a technically capable system into a failed system (Doll & Torkzadeh, 1989). Failure faced by IS are due to conflicts faced or poor acceptance by the users due to insufficient knowledge and training, along with the complexity of the system (Goldfinch, 2007). Many governments in both developed and developing nations have

produced good progress in providing digital services to their citizens, however, technology complexity and their bureaucracy continue to overwhelm governments (Nathanson, 2016).

As a result of authorising the implementation of a specific technology, users who are not totally agreeable to technology can definitely cause a hold-up in the implementation of new systems and result in systems to be underutilised or ruined. Moreover, when the usage of the system is mandated by an organisation, individuals maintain huge discretion concerning their usage of some features of the system (Hartwick & Barki, 1994). Generally, the discrepancy between the IT system and organisational performance is due to the absence of IS users' acceptance (Devaraj & Kohli, 2003).

1.2 Background

Assessing the effectiveness of performance or achievement of business' information systems had been identified as the most crucial concern in the field of IS management (Ball & Harris, 1982). Therefore, this study intends to assess the performance of the Engineering Maintenance System of the Malaysian Armed forces (hereinafter, EMESYS) by examining the factors that influence the satisfaction of users.

Engineering Maintenance System *(*EMESYS) is the online Management Information System (MIS) on equipment maintenance used by the Royal Electrical and Mechanical Engineers (REME) Corps in the maintenance on vehicle, weapon, electronic and miscellaneous equipment. EMESYS was developed by the *Pusat Teknologi Maklumat* (PUSTEKMA) since 2013.The purpose of having the system is the digitalisation of the maintenance information system by replacing the offline MIS based on Microsoft Excel application that has been used since 31 July 1995. The main disadvantages of the Microsoft Excel MIS is that it is a standalone application which is not integrated with other business processes such as spare part procurement, has the risk of introducing errors and compromising accuracy, has inherent lack of control which eases one to amend formulas, values or dependencies unnoticeable, is incompetent of supporting hasty decision making and most importantly regarded as serious offence in information security due to the exchange of data on military equipment through public email. While using new quality tools and implementation of the Enterprise Resource Planning (ERP) which is a comprehensive, packaged software solutions that seek to incorporate the whole range of process and functions of business in order to impart holistic view of the Malaysian Army logistic from a single information and IT architecture.

This study will evaluate user satisfaction of EMESYS. The findings of this study are of importance as it will identify difficulties encountered in implementing the EMESYS. The information obtained will help to enhance the process of implementation and evaluation of EMESYS so as to fully benefit the main client, which are the various formations and REME workshops in the Malaysian Army. This study is definitely coherent with the primary mission of EMESYS in ensuring the digitalisation of the maintenance management system and integration into the Malaysian Army's log system.

Proper analysis is needed to measure the appropriateness of information systems, so that useful information is obtained from the huge investment and is also consistent with corporate goal (Nugroho & Prasetyo, 2018). Therefore, this study is claimed to provide a better understanding of the users' satisfaction in mandatory contexts. Besides, this study will contribute to the growing body of knowledge on user satisfaction measures in EMESYS. This

study would be the first empirical study that focuses on the user satisfaction of EMESY Simple imitation by the Malaysian Army. Hence, it would be beneficial to test empirically the dimensions of service quality that are developed in this study. The findings will assist PUSTEKMA and REME Corps to improve users' satisfaction on EMESYS. It provides insights into how PUSTEKMA should design strategies to improve user's acceptance and satisfaction in the mandatory use context, where the Malaysian Army always encourage their personnel to adopt new technologies. Users of EMESYS may desire easy-to-use online services as well as resources that support their use of this system.

1.3 Problem Statement

Although the majority of prior research on technology adoption has been carried out primarily in the environment of voluntary implementation, the applicability of previous research in the context of mandatory use is unclear Venkatesh et al., (2010). Besides that, some scholars have noted that customer satisfaction, rather than behavioural intention, is the more appropriate dependent variable in mandatory use environment (Brown, Massey, Montoya-Weiss, & Burkman, 2002). Prior studies have recognised that there is a paucity of research that has systematically examined technology adoption in the mandatory use context.

The key purpose of this study is to evaluate the users' satisfaction with EMESYS. In particular, the *objective of this study* to investigate the relationship between system quality, information quality, service quality and IT infrastructure of EMESYS, with user satisfaction. Thus far, there is no clear view regarding the influence of IS service quality on satisfaction towards maintenance management system offered by EMESYS to users. Hence, there is an obligation to find the factors of online service quality in the mandatory use context because REME Corps personnel and all the Malaysian Army unit mandatorily use the system to perform vehicle and equipment maintenance and there are no other alternatives to using the system. This study expects to fill the literature gap by gaining a more comprehensive understanding on the satisfaction's level among the users of EMESYS and identifies the factor of online service quality from the implementation of EMESYS upon user's satisfaction.
The remainder of this paper is structured as follows. Section 2 discusses the pertinent literature relevant to this study. Section 3 explains the methodology of the study. Section 4 presents the data analysis and the results. Finally, section 5 concludes the paper.

2.0 Literature Review

The literature on user satisfaction stems mainly from the massive body of work related to IS effectiveness or interchangeably termed as management information system (MIS) success. The measure used includes the assessment of users' satisfaction and evaluation of the system capabilities, which is logical and relevant considering that these systems are built to facilitate decision-making and improve users' ability to interpret the maintenance environment. This literature review will cover *user satisfaction* as the dependent variable, and the four dimensions of independent variables (i.e. *system quality*, *information quality*, *service quality* and *IT infrastructure*).

2.1 System Quality

System quality are the attributes of the desired information system such as flexibility and reliability of the system, which includes intuitive system features, sophistication, flexibility and response time (Petter, DeLone, & McLean, 2008). The focus of these measures is typically on usability aspects and performance characteristic of the system under examination (Urbach & Müller, 2011).Costa et al. (2016) in their study on ERP adoption and satisfaction determinant tested that there is a strong and positive effect of system quality on user satisfaction.

System quality perceived ease of use measurement is the most common measure of system quality (Davis, 1989). Nevertheless, the system quality construct is not captured as a whole by perceived ease of use measure. According to Irawan & Syah (2017), the quality the information system which is combined from both hardware and software defines system quality. Performance of the system is the focus, which refers to how well the hardware, software, policies and procedure of information system capabilities in providing the users the information required. Rivard, Poirier, Raymond, & Bergeron (1997) built and tested a 40-item instrument that measures eight system quality factors: namely, reliability, portability, user friendliness, understand ability, effectiveness, maintainability, economy, and verifiability. There are other indexes of system quality created by other researchers using the dimensions distinguished by De Lone and McLean in their original model or through literature which have review of the system quality (Gable, Sedera, & Chan, 2003).

A study in the United Arab Emirates investigating the factors that influence users of the new e-government services, found that system quality had significant positive effect on user satisfaction(Al Athmay, Fantazy, & Kumar, 2016). Likewise, a study in Portugal in the field of mobile banking concluded that there is a significant relationship of system quality with user satisfaction (Qazi, Tamjidyamcholo, Raj, Hardaker, & Standing, 2017).Irawan & Syah (2017) in their study on ERP system found that the quality of the system had a positive and significant effect on user satisfaction.

Based on the above discussions, this study posits that:

H1: There is a significant positive relationship between system quality and user satisfaction of the EMESYS.

2.2 Information Quality

Information quality comprises the characteristics of the system outputs that are desirable, for example, management reports and web pages. The characteristics are relevance understand ability, accuracy, conciseness, completeness, currency, timeliness, and usability. According to Radityo & Zulaikha, (2007), information quality refers to the output of the system information, relating to the value, benefits, relevance and urgency of the information produced. Likewise, Petter et al., (2008) define information quality as system output's characteristics as being accurate, current and complete. Meanwhile Doll & Torkzadeh (1989) state that measuring information quality is often a critical dimension of user satisfaction instruments. Therefore, information quality is often not classified as a unique construct but

measured as user satisfaction's component. Therefore, measures of this dimension pose problems to IS success studies. Gable et al., (2003)developed a standard scale of information quality, and others have also developed their own scales using the literature that is pertinent to the type of information system that is being studied. According to Bravo, Santana, & Rodon (2016) in their study suggest that when timely, clear and updated information is provided by the IS, data and/or process transactions can be analysed in more accurate and timely manner by the individual. Their study also finds that there is a relevance of quality of information in both roles: the quality of the system influences through the information role and the intervention level impact is mainly through the automating role. Rana, Dwivedi, Williams, & Weerakkody (2014) have studied information quality in e-government and e-commerce as an antecedent to user satisfaction, the result revealed the significant effect of information quality on user satisfaction. Irawan & Syah (2017) in their study on ERP system proved the quality of information system to have positive and strong effect on user satisfaction. However, Ainin et al. (2012) in their study on National Higher Education Fund Corporation (PTPTN), found no significant relationship between system quality, service quality and information quality on system performance represented by user satisfaction.

Thus, this study hypothesizes that:

H2: There is a significant positive relationship between information quality and user satisfaction of the EMESYS.

2.3 Service Quality

Service quality is the quality of the support that is provided by the IS department and IT support personnel to system users such as responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. SERVQUAL which is adapted from the marketing field is a well-known instrument for measuring IS service quality Pitt, Watson, & Kavan (2006) According to Falgenti, Mai, & Pahlevi (2016), service quality was the overall support provided by information system provider that ensures proper application of information system.

Skill, experience, and capabilities of the support staff have been included as other measures of service quality (Yoon, Guimaraes, & O'Neal, 1995). An external provider is often involved in service quality due to the rising popularity of outsourcing for systems development and support (Gefen & Straub, 2000) Service quality is a kind of interaction between a user and an IT provider in serving function, particularly in the form of interaction or transaction involving core benefit exchanges such as physical goods, valuable information and other value-added interactions(Nugroho & Prasetyo, 2018).

A study in Europe and USA by (Balaban et al., 2013) found that service quality has a significant positive effect on user satisfaction of electronic portfolio system. Furthermore, Lee & Yu (2012) found that service quality had a significant positive effect on user satisfaction of project management information system in construction industry in Korea.

In this study, it is hypothesized that:

H3: There is a significant positive relationship between service quality and user satisfaction of the EMESYS.

2.4 IT Infrastructure

Allen & Boynton (1991) pointed out that the extent of IS structure can be assessed by the presence of centralised computing structures, the dissemination of personal and mini computers ,or the use of network technologies. Therefore, the IT infrastructure in this research focused on the computer and network viability and reliability provided to the EMESYS user. Byrd & Turner (2001)found that there is an inclination of having better IT infrastructure flexibility when the organisations have a group of staff who are highly technical and simultaneously result in an increase in the organisation's competitive advantage in major business management areas. Ang, Davies, & Finlay (2001)found that organisations with IT facilities that have a distributed structure are linked with IT usage .IT use is more influenced by decentralised IS structure than a centralised IS structure. However ,other researchers found that a centralised IS structure tends to foster efficiency and effectiveness. User support refers to the technical support users with regards to operating the information systems in the organisation.

According toMtebe & Raisamo (2014), instructors explained that one of the challenges they faced when taking up and using IT system in online education was insufficient IT infrastructure. This corroborates with the findings from a similar study carried out at the Open University of Tanzania (Samzugi & Mwinyimbegu, 2013). It was found that a poor internet connection and scarce number of computers hindered the adoption and use of the e-learning system .Dasuki (2018) highlighted that acquisition, management and maintenance IT infrastructure cost is as a challenge to adopt and implement IT system. According to Nwone (2014), there is a significant relationship between infrastructural issues and user satisfaction of the web portal.(Kyakulumbye, Olobo, & Kisenyi, 2013) also found that organizational support systems, IT infrastructure and users' perceptions had a strong relationship on IT utilization. However, Byrd & Turner (2000) in their study on measuring the flexibility of information technology infrastructure find IT infrastructure had no impact on user satisfaction.

Thus, this study postulates that:

H4: There is a significant positive relationship between IT infrastructure and user satisfaction of the EMESYS.

3.0 Methodology

This study employs a quantitative research to explore and investigate the relationship between the determinant variables of user satisfaction. The quantitative approach is found to be the most suitable method in information gathering compared to the qualitative approach. This approach is selected due to its capability to reach a broader scope of respondents within a shorter time frame.

The sample that was chosen are the users of the EMESYS, which are EME Group Army Logistic Command, EME Cell in Division and Brigade Headquarters, EME Workshop and Motor Transport cell in the Malaysian Army units. The survey was conducted through an

online questionnaire to ease the respondents in providing responses. A notification was posted on the EMESYS dashboard to notify the user on the requirement to answer the questionnaire. From the population of 804 EMESYS users, a total of 309 respondents participated in the study. Based on the sample guidelines model recommended by Krejcie and Morgan (1970) the recommended sample size is 265 participants. Thus, the total of309 respondents who participated in the study is viewed to be sufficient.

In this study, researcher amended the De Lone and McLean model by issuing an intention to use variable and use variable because the EMESYS is a mandatory use in the Malaysian Army vehicle and equipment maintenance. Figure 1 displays the conceptual framework schematic diagram.

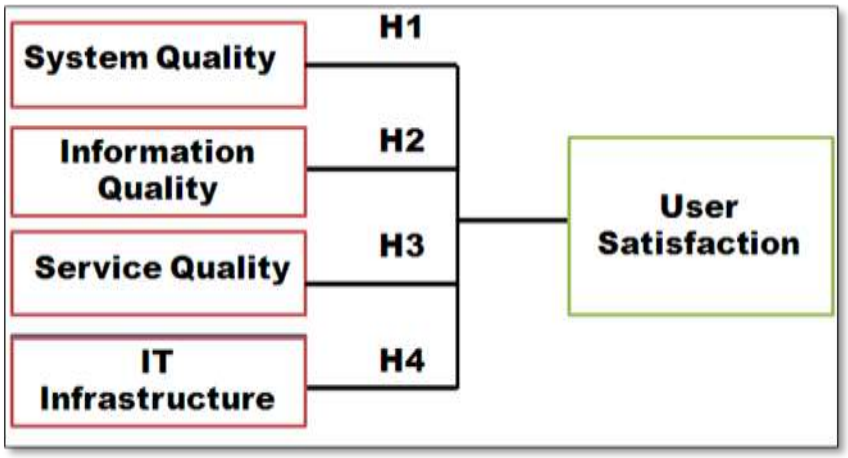

Figure 1: Conceptual Framework

4. Analysis and Results

4.1 Descriptive Analysis of Sample

As indicated in Table 1, out of 309 total respondents, majority of them were Unit Administrator which included 199 personnel or 60%, followed by R&I Cell with 31 personnel or 10%, 31 MIS Cell or 10%, 24 Workshop Commander or 7.8%, 23 EME Cell or 7.4% and lastly EME Group had the lowest contributors with 15 personnel or 4.8%. They are the primary users who are involved in the data processing and analysis while the Unit Administrator (secondary users) is only involved in requesting maintenance work through EMESYS.

Table 1: Respondents' User Category

User Category	Frequency	Percent (%)
EME Group	15	4.8
EME Cell (Division and Brigade)	23	7.4
Workshop Commander	24	7.8
MIS Cell	31	10.0
R&I Cell	31	10.0
Unit Administrator	185	60
Total	**309**	**100**

The result of age distribution reveals that the respondents in the 31 to 35 age group represented the highest percentage that was 40.5%, followed by those in 30 years and below range that was 31%. The percentage of the respondents who are 36 to 40 age group was 21.7%, and lastly, the smallest percentage was represented by respondents aged 41 and above with 6.8% as shown in Table 2.

Table 2 Respondents' Age

Age Group	Frequency	Percent (%)
30 years and below	96	31
31 - 35 years	125	40.5
36 - 40 years	67	21.7
41 years and above	21	6.8
Total	**309**	**100**

Table 3, illustrated that out of 309 respondents, the Junior Rank group which included 148 personnel or 47.9% constituted then majority of the respondents, followed by Senior Rank with 122 personnel or 39.5% and lastly, the Officer who became the lowest contributor with 39 personnel or 12.6%. What we could analyse here, the combination of both percentage of Senior and Junior Rank was 87.4% which represented more than three quarter of the respondent.

Table 3 Respondents' Rank

Rank	Frequency	Percent (%)
Officer	39	12.6
Senior Rank (PW 1 - Sjn)	122	39.5
Junior Rank (Kpl and below)	148	47.9
Total	**309**	**100**

The result in Table 4 shows that 228 personnel with percentage of 73.8% have SPM qualification which established the highest number of respondents in this study. Bachelor holders are mainly possessed by the Officers who formed 9.7% or 30 personnel. Meanwhile, 22 respondents (7.1%) have Diploma qualification and 20 respondents (6.5%) have Technical Certificate. The lowest contributor came from the respondents with Master's Degree qualification, represented by 9 personnel or 2.9% mainly possessed by the Officer.

Table 4 Respondents' Academic Qualification

Qualification	Frequency	Percent (%)
SPM	228	73.8
Technical Certificate	20	6.5
Diploma	22	7.1
Bachelor	30	9.7
Master's Degree	9	2.9
Total	**309**	**100**

The result of respondents' experience as EMEYS users disclosed that number of respondents who have less than 6 months' experience was 162 respondents or 52.4%, 70 respondents or

22.7% in between 6 to 12 months' experience and 52 respondents or 16.8% in between 1 to 2 years. Only 25 respondents or 8.1% have experience more than 2 years as EMESYS user. When the age group of less than 6 months is combined with the group 6 to 12 months' experience, it represented 75.1% that constituted more than half of the respondents. The system which is fully in operation on 1 June 2017 was introduced to all the unit by stages and these user groups are mostly the Unit Administrator which was introduced to the system only in June 2018. This result show in Table 5.

Table 5 Respondents' Experience as EMESYS User

Duration	Frequency	Percent (%)
Less than 6 months	162	52.4
6 - 12 months	70	22.7
1 - 2 years	52	16.8
2 years and above	25	8.1
Total	**309**	**100**

Table 6 shows the result of respondents who have not attended any EMESYS user course with NO answer was the highest number of respondents represented by 202 personnel or 65.4% and with YES answer is 34.6%, which was 107 respondents. Therefore, it shows that the EME personnel from the Division, Brigade and Workshop who attended the Train the Trainer course organised by PUSTEKMA have not conducted the EMESYS user course within their formation regularly.

Table 6 Attended EMESYS User Course

Status	Frequency	Percent (%)
Yes	107	34.6
No	202	65.4
Total	**309**	**100**

4.2 Descriptive Analysis of Variables

Normality test was conducted to analyse the data collected from respondents either normally distributed or vice versa. One of the assumptions suggested by scholars in examining normality is by analysing the level of skewness (the symmetry of a distribution) and the value of kurtosis (the clustering of scores towards the centre of a distribution) for all measured variables. There are many references in determining acceptable value of skewness and kurtosis such as Pallant (2016) who suggested that the normal value for skewness and kurtosis should be between +/- 2 to be acceptable and another scholar (Sekaran, 2010) insisted that the value between +/- 3 is acceptable for skewness and kurtosis in justifying the normality of data distribution. In the current study, the value of skewness and kurtosis for the main variables, as shown in the Table 8 indicates that the value were within the acceptable range of normality recommended by scholars. The results of all variables used in this study show that the kurtosis and skewness value of less than +/-1 (ranging value from +.253 to -.535) indicating that all data were normally distributed as illustrated in Table 7.

Table 7 Descriptive Statistic and Normality

Variables	n	Min	Max	Mean	Std Deviation	Skewness	Kurtosis
System Quality	309	1.89	5.00	3.42	.79052	.224	-.505
Information Quality	309	1.71	5.00	3.58	.73583	.156	-.439
Service Quality	309	1.60	5.00	3.61	.74980	.172	-.484
IT Infrastructure	309	1.00	5.00	3.17	.91981	.102	-.398
User Satisfaction	309	1.75	5.00	3.53	.78839	.253	-.535

Reliability test was used to evaluate the test conducted and verify the respondents' consistency in answering all variable items given. According to Hair et al. (2010), Cronbach's Alpha value is the appropriate test to evaluate the reliability inter-item consistency, the higher the coefficient the better the reliability of the instrument used to be measured. Nunnally (1978) suggested that the value of Cronbach's Alpha must be higher than 0.70 in order for the data to be strongly reliable to continue the research. The statistical analysis in Table 8 shows that the Cronbach's Alpha value ranging from 0.717 to 0.891, therefore it can be concluded that the research can be continued due to strong acceptable reliability of scales.

Table 8 Cronbach's Alpha Value

Construct	Number of Items	Cronbach's Alpha
System Quality (SYS)	9	0.878
Information Quality (INF)	7	0.891
Service Quality (SVC)	5	0.838
IT Infrastructure (INFRA)	4	0.717
User Satisfaction (SAT)	4	0.885

The degree of which variables are related will be reflected by the correlation test between two variables. It will comply with research objectives in examining the relationship between independent variables with the dependent variables. The results of the Pearson correlation is illustrated in Table 9 below and it generally indicates that Pearson correlation value ranges from 0.636 to 0.874 and each independent variable has a significant relationship with dependent variable at significant level of 1%. The results show that there are significant and positively strong correlations across all independent variables with the dependent variable.

Table 9 Pearson Correlations Results between Variables

	SYS	INF	SVC	INFRA	SAT
SYS	1				
Sig (2-tailed)					
INF	0.874**	1			
Sig (2-tailed)	0.000				
SVC	0.784**	0.850**	1		
Sig (2-tailed)	0.000	0.000			
INFRA	0.678**	0.636**	0.650**	1	
Sig (2-tailed)	0.000	0.000	0.000		
SAT	0.841**	0.861**	0.774**	0.714**	1
Sig (2-tailed)	0.000	0.000	0.000	0.000	

The regression model result suggests that this model can be adopted to verify all Independent Variables as well as provide explanation about Dependent Variable in this research. The coefficient value of determination of Adj. R^2 is **0.800** which is equal to 80%, signifying that the variance of independent variables impacts toward user satisfaction. Thus, 80% is explained by independent variables. Another 20% is from the other factors that influence to the user satisfaction on EMESYS among the users.

Table 10 shows the Multiple Regression Analysis results which shows that three out of four independent variables are significantly related to the dependent variable, System Quality, Information Quality and IT Infrastructure are significant in influencing the dependent variable (User Satisfaction). Information Quality has the strongest influence on the DV (β = 0.475, *p* = 000) followed by System Quality (β = 0.256, *p* = 000) and IT Infrastructure (β = 0.222, *p* = 000). However, Service Quality (β = 0.026, *p* = 0.604) is not significant in influencing the dependent variable.

Table 10 Multiple regression analysis

Model	**Unstandardized Coefficient**		t	***p***
	B	**Std. Error**		
(Constant)	.135	.103	1.309	.191
System Quality	.255	.055	4.595	.000
Information Quality	.508	.067	7.582	.000
Service Quality	.028	.053	.520	.604
IT Infrastructure	.190	.031	6.168	.000

Note: Dependent variable: User satisfaction, F=308.224***, Adj R^2=.800, SE=.35293

System Quality has a significant positive relationship with user satisfaction of EMESYS (*β* = 0.256, *p* = 0.000). EMESYS users perceived system quality attributes of the desired information system such as flexibility and reliability of the system, which includes easy to use, system features, flexibility and response time and easily to access. Therefore, Hypothesis 1 is supported in this study.

Information Quality has a significant positive relationship with user satisfaction of EMESYS (*β* = 0.475, *p* = 0.000). It shows that users of EMESYS perceived the information quality is a critical dimension of user satisfaction. Timely, clear and updated information provided by the system will help the user to manage the maintenance data or process more efficiently. Therefore, Hypothesis 2 is supported in this study.

Service Quality has no significant relationship with user satisfaction of EMESYS (*β* = 0.026, *p* = 0.604). The EMESYS has been implemented more than 2 years and reached the system maturity. There were less numbers of request to the technical support staff by the users for troubleshoot problems and solutions. Furthermore, service quality is not significant once a system has been adopted and used a few times by users. Therefore, Hypothesis 3 is not supported in this study.

IT Infrastructure has a significant positive relationship with user satisfaction of EMESYS (*β* = 0.222, *p* = 0.000). The EMESYS users perceived IT infrastructure dimensions specifically the computer and intranet network provided to the EMESYS user is very crucial. Importantly, the system can only be assessed through Army Net secured network.Therefore, Hypothesis 4 is supported in this study.

5. Discussion and Conclusion

This study is an empirical research that attempts to investigate the relationship between system quality, information quality, service quality and IT infrastructure with user satisfaction among EMESYS users in the Malaysian Army. This section will discuss the research findings, research limitations and the recommendations for future research. This paper also focuses on the essential findings of the research with respect to the relationship between user satisfaction as the dependent variable and system quality, information quality, service quality and IT infrastructure as the independent variables.

The findings revealed that three independent variables were significantly related to user satisfaction of EMESYS. The first independent variable is *system quality*; Based on the findings, system quality is reflected very well by the items used to measure it and there is a strong relationship between the system quality of EMESYS and user satisfaction. This finding is supported by previous studies, for example, Irawan & Syah (2017), Qazi et al. (2017), Al Athmay et al. (2016), Costa et al. (2016) and DeLone and McLean (2003). Based on the results, most of the users agree that EMESYS has a system quality that enables them to perform their job better. This meant that the better the quality of the system, the more satisfied the users are of EMESYS.

The second independent variable examined in this study is *information quality*; whereby the study aimed to identify the relationship between information quality and user satisfaction. Based on the findings, there is a strong relationship between the information quality of EMESYS and user satisfaction. This finding is supported by previous studies by Irawan & Syah (2017), Bravo et al. (2016), Rana et al. (2014) and DeLone and McLean (2003). It shows that EMESYS can help users to complete their tasks more efficiently. This meant that the better the information quality, the more satisfied the EMESYS users are.

Surprisingly, the third variable, *service quality*, is not statistically significant in explaining the variance in user satisfaction. As a result, it contradicts the findings from previous studies (Balaban et al., 2013,Lee & Yu, 2012, De Lone and McLean, 2003, Negash et al., 2003) which found that service quality strongly predicts users' satisfaction. For this contradiction, this study will offer some explanations. Firstly, after more than 2 years of the EMESYS implementation and reaching the system maturity, there were less number of requests from users for troubleshoot problems and solutions. This finding was supported by a study by Dwivedi et al. (2013) which found that service quality is not significant once a system has been adopted and used a few times by users. Secondly, the users who use this system perceived the system's service quality as less important because it does not provide a direct service to the Unit Administrator user category, which was the majority of the respondents (61%). The EMESYS is just a mean for them to request vehicle and equipment maintenance and they do not interact directly with the data or use it for other purposes. This user category is more interested in the quick and easy processing of their maintenance request. This finding was supported by Ainin et al. (2012) in their study which discovered that there was no significant relationship between service quality on system performance indicated by user satisfaction.

The fourth dimension is *IT infrastructure*; the study aims to identify the relationship between IT infrastructure of EMESYS and user satisfaction. Based on the findings, it is found that IT infrastructure is reflected very well by the items used to measure it and there is a strong relationship between IT infrastructure of EMESYS and user satisfaction. This finding is

supported by previous studies by Dasuki (2018), Mtebe & Raisamo (2014), Nwone (2014) and Kyakulumbye et al. (2013). This meant that the better the IT infrastructure, the more satisfied the users of EMESYS are.

Implications of the Research Findings

This study could serve as a guide to the Malaysian Army in deploying e-government technologies in general and EMESYS in particular. In summary, this work suggests that EMESYS is very practical for its ability to simplify equipment maintenance Management Information System by the users. In addition, this system is capable to access real time and accurate information on vehicle and equipment maintenance by all users. Besides that, EMESYS was developed with the aim to simplify, speed up and make the entire work of maintenance MIS become more efficient. These results indicate that the goal has been achieved successfully.

Theoretical Implication.
The major theoretical implication of this study is that it supplements to a growing body of literature on information system in a government context. This result indicates that the De Lone and McLean IS Success Model dimension adequately reflects the users' criteria for evaluating EMESYS. This finding establishes the representative dimensions of information system and the relevant indicators that measure each dimension. The indicators constitute a valid and reliable measurement instrument. Such a scale may serve as a managerial tool to the extent that the managers of EMESYS can assess the performance of EMESYS and introduce proper practices, which are targeted at enhancing system quality. In other words, the scale of the IS quality in this study can be used to assist the management to have a more precise mapping of the performance of specific domains and to recommend more effective corresponding improvement programs.

Practical Implication.
There are more specific practical implementations that can be drawn from the results of this study. First, the results found that the IT infrastructure was the least significant contributor to user satisfaction. Therefore, the IT infrastructure dimension should be highly focused on in order to improve the accessibility to EMESYS and subsequently increase user satisfaction. The viability and reliability of computer and intranet network provided to the EMESYS user is very crucial, especially as the system can only be assessed through the Army Net secured network. Equally important is to increase the Army Net bandwidth in order for the system to be assessed swiftly.

Second, information quality was the most significant contributor to user satisfaction. It is recommended that the administrator of the system should enhance the information quality of EMESYS, for instance, by adding Executive Information System (EIS) on the dashboard and a new menu for references (i.e. maintenance policies, instructions and manuals). EMESYS should also hold sufficient security levels in communications and meet data protection requirements regarding the security/privacy of the users.

Third, it is recommended that the administrators of EMESYS should focus on enhancing the system quality. In order to increase the navigation of EMESYS, the administrator could adopt a more user-friendly interface (for example, in the menu design, screen layout and interaction method) to assist users while assessing the system, and thus increase the user satisfaction level. Furthermore, various workshops should frequently conduct training for EMESYS

users, particularly for the unit administrator group. The EMESYS must also comply with the documentation regulations as specified in the Ministry of Finance asset management policy. In addition, for easy access to EMESYS, it is recommended that a gateway should be provided in order for it to be accessed through the Internet without compromising the system security.

This study has a few limitations that need to be considered when interpreting the results. First, this study used the implementation of EMESYS as the main subject to study users' satisfaction within the mandatory environment. The analytical results presented in this study thus may have limited generalisability to other online service providers because users' or customers' perceptions of information system quality are context-dependent and detailed effects of satisfaction may be related to specific services.

Second, this study has constructed a conceptual framework by using De Lone and McLean's IS Success Model to examine the relationship between information system quality and users' satisfaction for EMESYS. There may be other information system quality models that can be applied to study users' satisfaction in the mandatory EMESYS context.

Suggestions for Future Research

The following directions for additional study stem from the limitations of this study. First, future research could be conducted to compare the information system quality dimensions identified by means of a longitudinal assessment of the EMESYS during different periods. Besides that, different methodologies such as content analysis, focus groups or interviews may be conducted to enrich the findings and broaden the perspectives of information system quality and users' satisfaction in the EMESYS context.
The information system success model is used to explain the causal relationships between the determinants that have an effect on EMESYS users' satisfaction. The research study examines user experience with EMESYS to evaluate the satisfaction of the users. The users' experiences are grouped into direct users' experience with the system, denoted by EMESYS quality construct. In summary, this research is useful to determine the system quality, information quality and IT infrastructure, which become the vital factors that contribute to information system users' satisfaction

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