Measuring End-User Computing Satisfaction (EUCS) on Automated Examination Invigilation System (EIS)

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ABSTRACT

This paper measures the satisfaction level of end user on Examination Invigilation System (EIS). The study employed End User Computing Satisfaction (EUCS) model to measure critical factors of content, accuracy, format, ease of use, and timeliness. Questionnaires were used as the instrument to measure the level of end-user satisfaction. This study had distributed 110 EUCS questionnaires to various departments in Centre of Foundation Studies, Universiti Teknologi MARA (UiTM) Cawangan Selangor Kampus Dengkil. A Statistical Package for Social Science (SPSS) software was used to analyse the data, such as frequency analysis, descriptive analysis and correlation analysis. The findings showed 84.83% of the users were satisfied with the EIS system. The correlation analysis showed a strong relationship between EUCS factors and the overall satisfaction towards EIS.

Keywords: *EIS, Correlation, EUCS, Invigilation.*

I. INTRODUCTION

Examination is part of an education system. Many processes are involved in examination including examination scheduling. In examination scheduling, assigning invigilators, students at the right venue, time and date are important. However, it is not easy to handle exam scheduling process. The person or team involved in the examination schedule needs to identify the right venue, time for invigilators, students, courses and others. Thus, it is time and energy consuming to complete a perfect examination schedule. The same situation is faced by the Exam Committees in Centre of Foundation Studies (CFS), UiTM as the exam invigilation timetable scheduling in CFS was done manually. The tedious manual process has been changed with the used of automated systems known as the Examination Invigilation System (EIS). Examination Invigilation System (EIS) is a system that allows all staff whether academic or non-academic to generate their personal invigilation schedule. The staff or invigilators can view and print their individual timetable using the system from anywhere as long as they have access to Internet. As for administrators, they can add, remove and reset invigilation timetable for all invigilators and students. For students, they can generate their exam slip using the system anywhere as long as they have access to Internet.

The objectives of this study are:

- To find the level of end-user satisfaction.
- To find the relationship between satisfaction and EUCS factors.

Through EUCS, the user's response towards this system is able to be attained and improvement can be made if necessary.

II. LITERATURE REVIEW

Measuring user's satisfaction on a system is Information System (IS) disciplined. Ives et al. [1] initiated a standard measurement of User Information Satisfaction (UIS) based on the concept of UIS by Cyert and March [2] since there is no adequate mechanism to evaluate information system effectiveness that meets their information requirements. Chin and Lee [3] defined end-user satisfaction with an information system as the overall affective evaluation an end-user experience related with the information system. Meanwhile, Doll and Torkzadeh [4] defined end user satisfaction as the affective attitude towards a specific computer application by someone who interacts with the application directly.

End User Computing Satisfaction (EUCS) is extended

from User Interface Information Satisfaction (UIS) model. EUCS model proposed by Doll and Torkzadeh [4] focused on five factors; i.e., content, accuracy, format, ease of use, and timeliness. However, this model was modified by Chin and Lee [3] by adding two more factors of satisfaction; i.e., system speed. Furthermore, EUCS model by Chin and Lee was modified by Amdan et al. [5] by adding one more factor of satisfaction; i.e., system reliability.

Several studies have used EUCS model by Doll and Torkzadeh to evaluate information system such as Digital Nursing Assessment Tool [6], Logistic and Courier Service [7] and Enterprise Resource Planning Systems [8]. The model and instrument were internally consistent and stable when applied to the users. Therefore, this study focuses on adapting EUCS model by Doll and Torkzadeh in measuring satisfaction of the users on EIS system.

III. METHODOLOGY

Figure 1 shows the research model used in this study which is adapted from Doll and Torkzadeh [4]. A survey is used to measure the users' satisfaction on EIS system in Center of Foundation Studies, UiTM Kampus Dengkil. To achieve the objectives of this study, a survey was distributed to 9 different departments. There were 110 respondents who completed the survey.

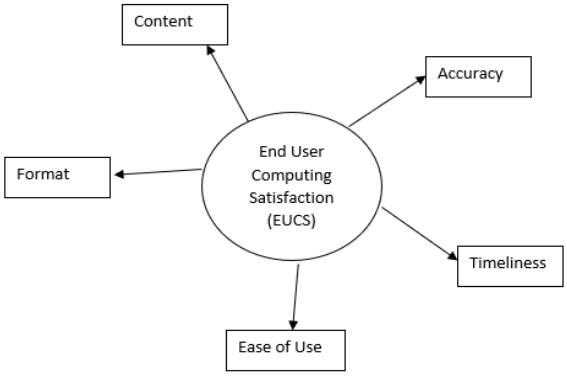

Fig. 1: End -user computing satisfaction model.

Instrument used for this study is based on end-user computing satisfaction (EUCS) which was developed by Doll and Torkzadeh [4]. This instrument is widely used and this indicates the instrument is reliable over time. The instrument consists of 5 dimensions: content, accuracy, format, ease of use, and timeliness.

The survey in this study explained the purpose of the study. It was divided into 2 parts namely: (1) Part A -Demographic, and (2) Part B - EUCS. A five-item scale was used, where 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. The instructions requested the respondents to tick the best response that describes their satisfaction level with their experience in using EIS system.

This study used SPSS software for analysing the data which included frequency analysis, descriptive analysis and correlation analysis. In addition, the study also tested the reliability of the instrument so that it produces a valid result

IV. ANALYSIS AND RESULT

A. Reliability Test

Table 1 below summarizes the reliability test analysis for each domain with Cronbach's alpha for the content (.860), accuracy (.885), format (.789), ease of use (.757) and timeliness (.865).

Table 1: Reliability Test

	Cronbach's Alpha (Coefficient)
Content	.860
Accuracy	.885
Format	.789
Ease of Use	.757
Timeliness	.865

The timetable shows that the values of Cronbach Alpha for each domain were above 0.7. This study has used reliable instruments to measure user satisfactions.

Table 2 demonstrates various of respondents who participated in this study. A total of 110 respondents of different ages from various department participated in the study.

Table 2: Respondents' demographics

Attributes	**Characteristics**	**Frequency (persons)**	**Frequency (%)**
Gender	Male	*16*	*14.5*
	Female	*94*	*85.5*
Age	25-30	*13*	*11.7*
	31-35	*48*	*43.2*
	36-40	*21*	*18.9*
	41-45	*14*	*12.6*
	46-50	*9*	*8.2*
	51-55	*3*	*2.7*
	56-60	*2*	*1.8*
Department	ACIS	*8*	*7.3*
	APB	*15*	*13.6*
	BIOLOGY	*13*	*11.8*
	CHEMISTRY	*13*	*11.8*

	COMPUTER SCIENCE	*12*	*10.9*
	PHYSICS	*14*	*12.7*
	TESL	*15*	*13.6*
	LAW	*10*	*9.1*
	MATHEMATICS	*10*	*9.1*

From the 110 respondents, 16 were males while 94 were females. The age range of respondents who used this system varied from 25 years to 60 years old. Many respondents who used this system were from the age 31 to 40 years old. Majority of the respondents (43.2%) involved in this study were in the range of age 31 to 35 years old from various departments. There were nine departments involved in the study which were ACIS, APB, Biology, Chemistry, Computer Science, Physics, TESL, Law, and Mathematics from the Center of Foundation Studies, UiTM.

B. Level of satisfaction

The overall results of level of satisfaction is shown in Table 3. The mean level of satisfaction is 50.9. It is shown that 84.83% of the users were satisfied with the EIS system.

Table 3: Overall level of satisfaction

	N	Minimum	Maximum	Mean	Std. Deviation
Satisfaction	110	26.00	60.00	50.90	6.58

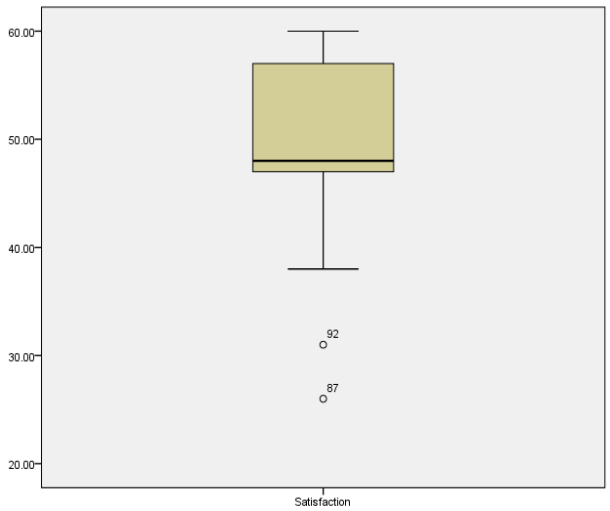

Fig. 2: Box plot level of satisfaction

Figure 2 shows the box plot, where most users have rated their satisfaction level between 4 and 5 for each domain such as content, accuracy, format, ease of use, and timeliness.

An analysis for level of satisfaction by age and departments was illustrated in table 4 and 5 below.

Table 4: Level of satisfaction by age.

Age	Minimum	Maximum	Mean	Satisfaction (%)
25-30	42.00	60.00	52.46	87.43
31 - 35	26.00	60.00	49.80	83.00
36 - 40	43.00	60.00	51.10	85.17
41 - 45	42.00	60.00	51.50	85.83
46 - 50	38.00	60.00	52.44	87.40
51 – 55	49.00	60.00	54.00	90.00
56 - 60	46.00	53.00	49.50	82.50

It is observed from table 4, the lowest mean score (51.10) for the level of satisfaction range is in the 36 until 40 years old with percentage level of satisfaction 85.17% . Meanwhile, age range between 51 until 55 years old highly satisfied with EIS . Mean score was (54.00) and the percentage of satisfaction was 90.00%.

Table 5: Level of satisfaction by department.

Department	Minimum	Maximum	Mean	Satisfaction (%)
ACIS	40.00	60.00	51.00	85.00
APB	43.00	60.00	52.00	86.67
BIOLOGY	45.00	60.00	49.69	82.82
CHEMISTRY	47.00	60.00	50.69	84.48
COMPUTER SCIENCE	38.00	60.00	49.83	83.05
PHYSIC	26.00	60.00	48.21	80.35
TESL	42.00	60.00	50.40	84.00
LAW	47.00	60.00	51.00	85.00
MATHEMATICS	47.00	60.00	56.70	94.50

It is observed from table 5, descriptive analysis on level of satisfaction by nine departments in Center of Foundation Studies. The highest mean score was (56.70) which is from Mathematics department with percentage of satisfaction 94.50%. Meanwhile, the lowest mean score (48.21) was from Physic department with 80.35% of satisfaction.

The results of EUCS by each domain are shown in Table 6.

Table 6: Level of satisfaction by domains

	Minimum	Maximum	Mean	Std. Deviation
Content	9.00	20.00	17.05	2.28
Accuracy	3.00	10.00	8.45	1.30
Format	3.00	10.00	8.47	1.30
Ease of Use	5.00	10.00	8.54	1.16
Timeliness	4.00	10.00	8.38	1.28

From the result, the highest mean was satisfaction with the content (17.05) and the lowest mean was timeliness (8.38). It seems like most of the staff were satisfied with content domain but less satisfied with timeliness domain. The highest standard deviation was content (2.28) and the lowest was ease of use (1.16). The content deviated too far from the mean and ease of use was too close to the mean. The minimum, maximum, mean and standard deviation results have answered research objective 1.

C. Relationship between Satisfaction and EUCS domains

Table 7: Pearson Correlation

		Content	Accuracy	Format	Ease of Use	Timeliness
Satisfaction	Pearson Correlation	.937**	.924**	.858**	.828**	.910**

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

According to Schober et al. [9], rule of thumb for interpreting size of correlation between items are scaled between the range of -1 to 1, where 0 indicates no relationship. The distribution of the variables was tested, and it was normal. Therefore, Pearson correlation was used in this study in order to find the correlation from each domain. The result in table 7 shows strong positive correlation between satisfaction and five EUCS domains. The strongest correlation was between satisfaction and content = 0.937, followed by accuracy = 0.924, timeliness = 0.910, format = 0.858, and ease of use = 0.828. The correlations were significant at 0.01 level (2-tailed). Figure 3 to Figure 7 show the scatter plots for correlation between domains.

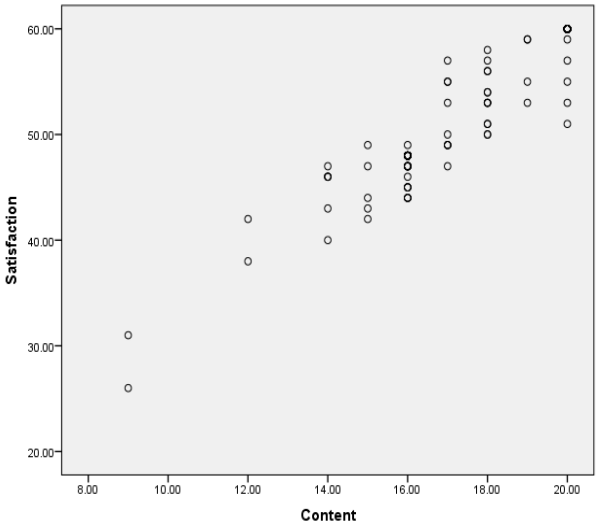

Fig. 3: Scatter plot overall satisfaction versus content.

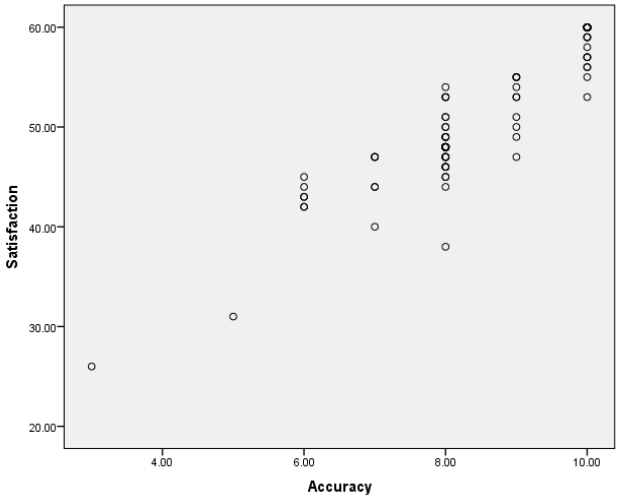

Fig. 4: Scatter plot overall satisfaction versus accuracy.

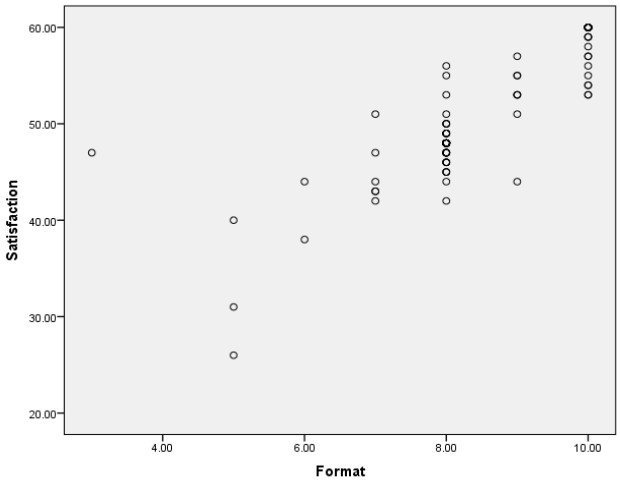

Fig. 5: Scatter plot overall satisfaction versus format.

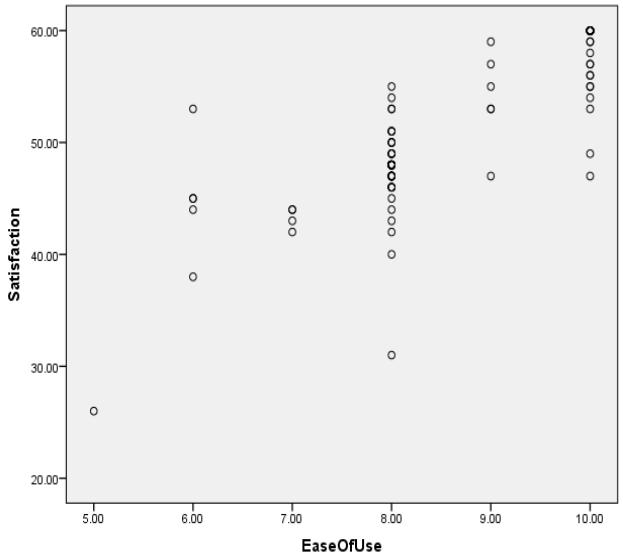

Fig. 6: Scatter plot overall satisfaction versus ease of use.

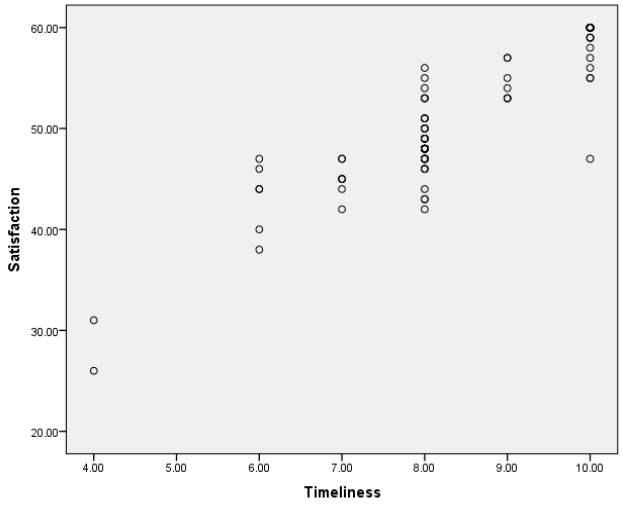

Fig. 7: Scatter plot overall satisfaction versus timeliness.

V. CONCLUSION

This paper attempted to measure the level of end-user satisfaction of Examination Invigilation System (EIS) and determined the relationship of five domains that influence satisfactory level. In overall, the research objectives were achieved. Research objective 1 indicated that 84.83% of users were satisfied with the EIS. This was explained in descriptive statistics table based on each EUCS domains. Based on the result of research objective 2, the ranking of EUCS domains commenced with content (0.937), accuracy (0.924), timeliness (0.910), format (0.858), and ease of use (0.828). Furthermore, the result showed strong positive relationship between EUCS domains and satisfaction towards EIS. Thus, EUCS domains strongly influenced the end-user's satisfaction when handling the EIS.

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