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Technology Acceptance and Computerized Traffic Tests in the Emirate of Sharjah

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Abstract. This study applied the technology acceptance model (in its original form and in an extended form) to the case of the computerized traffic test administered in the Emirate of Sharjah. The authors collected their data using a questionnaire from a sample of 397 applicants who took the traffic test over a five-month period. Collected data were analyzed using descriptive statistics, reliability analysis, correlation analysis, and regression analysis.

The results indicated significant correlation between perceived usefulness and perceived ease of use (the two main variables of the TAM). In addition, the results showed significant positive effects for perceived usefulness, perceived ease of use, attitude, and computer skills on the applicant's choice of the computerized traffic test. However, there were no significant effects for the level of satisfaction with the system or enjoyment of the system on the applicant's choice of the computerized traffic test.

Keywords: Traffic tests, Information systems, Technology, Technology acceptance.

Introduction

In recent years, the government of the United Arab Emirates (UAE) has placed much emphasis on the use of information tehcnology in many areas of its operations. For example, some emiarates have adopted e-government systems to facilitate people's access to government offices. An individual can now receive several services and perform different transactions with government branches and offices through the use of the Internet without the need to being physically present in government offices. Increased realization and awarness among the public of the importance of information technology has also facilitated government move to increase the use of technology.

As a governmental unit, the Traffic Department in Sharjah uses information technology and systems in most of its operations and transactions. One current aspect of using information technology applications in the department's operations is the introduction of the computerized traffic tests. In the past, every new applicant for a driving license was required to take a manually written traffic test. Such a test is usally marked and the results are announced few days later. Staring with September 2003, the department decided to use computerized traffic tests along with the manually written one. Thus, an applicant can make a choice between the two forms of the traffic test. From an applicant's point of view, a computerized traffic test has an advantage over a manual test in terms of processing speed, which allows him/her to know the results shortly after the test. However, basic computer knowledge, among other factors, may be needed for an applicant to select the computerized option. This raises the general question of technology acceptance among traffic test applicants.

Several researchers, e.g. Davis [1] and [2], Bajwa, Rai and Brennan [3], Al-Gahtani and King [4], and Cheung, Chang, and Lai [5], have examined the antecedents of and/or the consequences of using new technology and its acceptance. Their studies have identified factors that affect the extent and conditions of using technology in different settings. The two main factors identified in the literature are perceived ease of using the system and perceived usefulness of using the system.

This paper reports the results of applying an extended model of tehnology acceptance to the case of computerized traffic tests in Sharjah. The paper is organized in five sections as follows. The next section reviews relevant literature on technology acceptance. The second section develops the research hypotheses. The third section presents the research method. The fourth section presents the results and findings. The last section addreses the conclusions, limitations, and recommendations for future research.

Literature Review

Davis [1] proposed and tested a model for information system use that is affected by two major variables. The first variable is the perceived usefulness of the system, which is defined as the degree to which a person believes that using a particular system enhances his/her job performance. The second variable is perceived ease of use, which is defined as the degree to which a person believes that using a particular system is free of effort. This proposed model for information system use is currently known as the Technology Acceptance Model (TAM).

Davis tested the model using a set of data dealing with the use of (or intention to use) an e-mail system, a file editor, and two graphic packages. Using correlation and regression analyses, he found that perceived usefulness had significant effect on actual use and on intention to use. However, perceived ease of use showed insignificant effects on actual use or intention to use despite significant correlation between the two. Accordingly, Davis concluded that ease of use operated through usefulness.

Following Davis [1], several studies have been carried out to validate the Technology Acceptance Model in different settings and across a broad range of information technology applications. Horton *et al.* [6] studied the applicability of the model to intranet usage in two organizations (a bank and an engineering company). The results indicate that the two variables (perceived usefulness and perceived ease of use) are strong predictors of self-reported use of (and intention to use) intranet at the bank. However, in a two-step regression the effect of perceived ease of use on usage was mediated by intentions. Furthermore, the results indicate that the model's applicability varies between intranets and demonstrates that self-reported and actual measures of usage are not interchangeable.

Selim [7] applied the technology acceptance model in the education sector. He used the model to assess university students' acceptance of course websites as an effective learning tool. The results indicate that course website usefulness and ease of use are key determinants of the acceptance and usage of course website as an effective and efficient learning technology. These two constructs (i.e., course website usefulness and ease of use) accounted for 83% of the total variance in course website acceptance and usage.

Chau and Hu [8] investigated the adequacy of three information technology models in a healthcare professional setting. The models investigated were the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and a decomposed TPB model. The results indicate that the technology acceptance model is superior to the model of planned behavior in explaining physicians' intentions to use telemedicine technology. In addition, perceived usefulness showed a significant effect on attitude and behavioral intention in both TAM and the decomposed TPB models. However, perceived ease of use showed no significant effects on attitude or behavioral intention in any of the investigated models. Furthermore, attitude was found to be an important factor influencing physician's intention to use telemedicine technology.

Igbaria *et al.* [9] examined key factors affecting personal computing acceptance in small firms. The findings indicate that perceived ease of use is a dominant factor in explaining perceived usefulness and system usage, and that perceived usefulness has a strong effect on system usage. The results also indicate that exogenous variables influence both perceived ease of use and perceived usefulness, particularly management support and external support. Inconsistent with prior research in large firms, relatively little support was found for the influence of both internal support and internal training.

Koufaris [10] examined how emotions and cognitive responses to visiting a web-based bookstore for the first time can influence online consumers' intentions to return and their likelihood to make unplanned purchases. The results confirm the double identity of the online consumer as a shopper and a computer user as both shopping enjoyment and perceived usefulness of the site strongly predict intentions to return. The

findings also indicate that some individual and web site factors (i.e., product involvement, web skills, challenges, and use of value-added search mechanisms) all have significant impact on the web customer.

Al-Gahtani [11] investigated empirically the applicability of the Technology Acceptance Model in the United Kingdom. He used a questionnaire to collect data from university students with one-year full-time work experience regarding the usage of information technology (spreadsheets). The findings indicate that the Technology Acceptance Model is very applicable to the UK and that perceived usefulness has the largest influence on information technology acceptance followed by users' attitudes toward information technology. In addition, perceived usefulness operates directly on information technology acceptance and indirectly through attitudes. Meanwhile, perceived ease of use has a larger influence on users' attitudes than perceived usefulness.

Veiga, Floyd and Dechant [12] explored potential impacts of differences in national culture on information technology implementation and acceptance. They argued that culturally induced beliefs (including individualism, collectivism, uncertainty avoidance, long- and short-term orientation, and power distance) could impact key variables in the Technology Acceptance Model. The authors offered 16 propositions to expand antecedents of perceived usefulness, perceived ease of use, and attitude toward using information technology.

Mathieson, Peacock and Chin [13] proposed extending the Technology Acceptance Model to incorporate perceived user resources. They argued that the Technology Acceptance Model has an inherent limitation based on its assumed usage. That is, the model assumes no barriers that would prevent an individual from using an information system if he/she chose to do so. The results indicate that perceived user-resource, as a construct, is a valuable addition to the model.

Al-Gahtani and King [4] applied an extended version of the Technology Acceptance Model that incorporated user characteristics, system rating, and the end-user computing satisfaction. The results indicate significant relationships among the variables in the extended model.

Research Model and Hypotheses

Based on the above literature review, the authors of this study used the original constructs of Davis [1] along with four additional variables (user's computer skills, user satisfaction, attitude, and system enjoyment) in applying the technology acceptance to computerized traffic tests. Figure 1 shows the extended model used in the study. The meaning of each variable and its measures are discussed in the next section.

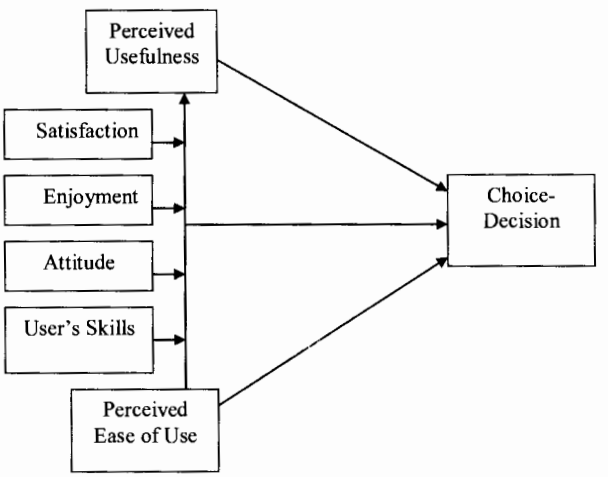

Fig. 1. An extended model for technology acceptance.

Using the above model and the reviewed literature, the authors formulate the following six null hypotheses for the purpose of empirical testing:

H_{01}: There is no significant effect for perceived ease of system use on an applicant's choice of a computerized traffic test.

H_{02}: There is no significant effect for perceived usefulness of the system on an applicant's choice of a computerized traffic test.

H_{03}: There is no significant effect for an applicant's computer skills on his/her choice of a computerized traffic test.

H_{04}: There is no significant effect for an applicant's attitude towards the system on his/her choice of a computerized traffic test.

H_{05}: There is no significant effect for an applicant's level of system enjoyment on his/her choice of a computerized traffic test.

H_{06}: There is no significant effect for an applicant's level of satisfaction on his/her choice of a computerized traffic test.

Research Method

Empirical research methodology usually deals with the sample frame and sampling procedures, data sources and collection tools, variables and their measures, and statistical techniques used to analyze the data. The following is a brief description of each of these elements.

Sample frame and sampling procedures

The driving test center schedules applicants for the traffic test at least three weeks before the test. Approximately half of the applicants (about 190 each month) select the

computerized traffic test option. The sample frame consisted of all applicants taking the computerized test between November 1, 2003 and March 31, 2004 (approximately 1,000 applicants). The second author asked the supervisor of the driving test center to distribute the survey instrument to each applicant taking the test every other day in the week (e.g. Saturday, Monday, and Wednesday or Sunday and Tuesday) of each month during the above stated period. This method of distributing the survey instrument was intended as a form of partial randomization for the sample selection. The second author also asked the supervisor of the driving test center to have each applicant fill and return the instrument before announcing the test results to partially avoid mood effects. The total number of the survey instrument distributed was 548 questionnaires.

The authors used a short questionnaire containing 17 questions. The first 11 questions were designed to collect demographic and general information. Question 12 was designed to obtain a measure for the criterion (dependent) variable. Questions 13-17 contained measurement scales adopted from different sources (as explained below) to measure the independent variables.

The authors pilot-tested the questionnaire before its final administration. They used 25 individuals who took the computerized test on three different days during the month of October 2003. The pre-testing process resulted in some minor changes in the wording of the questionnaire. A copy of the questionnaire appears in the Appendix.

Variables and measures

This study used one variable as the dependent variable and six independent variables. A brief description of each of these variables and their measurements follows:

Usage. This variable refers to one or more indicators of a system's success. Prior studies, e.g. Lee [14], Thomson *et al.* [15], and Davis [2] among others, have used different self-reported indicators to measure actual usage of a system. These measures include daily usage, frequency of use, number of applications used, perceived usage level, and sophistication level of application used. Because the computerized traffic test is administered for a successful applicant once, none of the above indicators is considered a suitable measure for usage in the current research. Accordingly, the authors used the choice-decision of an applicant to take the manual written traffic test or the computerized traffic test as the usage indicator. At the time of scheduling the test, each applicant is given the choice to have the manual written test or the computerized traffic test. The questionnaire asked each respondent to indicate his/her choice between taking the manual written traffic test or the computerized traffic test (after his/her actual experience with the computerized test). Answers to that question provided the measure for the variable usage. For the purpose of statistical analysis, a respondent choice for a manual test was coded zero (0) while a respondent choice for a computerized test was coded one (1).

Ease of Use. This variable refers to one's belief that using a particular system is free from physical and mental effort [1]. A six-statement scale adapted from Moore and Benbasat [16] was used to measure this variable. This scale is represented on the questionnaire by the first six statements under item 14. Each respondent was asked to indicate the extent to which he/she agrees with each of the six statements using a five-point numerical scale ranging from one (strongly disagree) to five (strongly agree). Summation of the scores on those six statements yielded the measure for ease of use.

Perceived Usefulness. This variable refers to the degree to which a person believes that using a particular system would enhance his/her job performance. A four-statement scale adopted from Igbaria *et al.* [9] was used to measure this variable. The last four statements under question 14 (10, 11, 12, 13) represent this scale. Each respondent was asked to indicate the extent to which he/she agrees with each of the four statements using a five-point numerical scale ranging from one (strongly disagree) to five (strongly agree). Summation of the scores on those four statements yielded the measure for perceived usefulness.

Attitude Toward Computerized Traffic Tests. Attitude is a construct that one can describe as a pre-disposition to respond favorably or unfavorably to an object, person, event, institution or another discriminable aspect of the individual's world [17]. To measure a construct, one would usually use a multiple-item scale. This research uses a six-item attitude scale that was originally developed by Davis [2] based on the work of Ajzen and Fishbein [18]. Each respondent in the sample was asked to rate five items according to how he/she feels about the computerized traffic test using a five-point semantic differential scale. Item 13 on the questionnaire shows the six-item scale. Individual responses to those six items were translated into numerical scores and summed up to obtain the measure for the individual's attitude.

User's Experience. This variable refers to an individual's length of time and skill level of using computers. It also refers to one's experience with computerized traffic tests. Each individual was asked to indicate the number of years he/she has been using computers and his/her current skill level in using computers. The skill level was measured using a five-point numerical scale ranging from one (low skill level) to five (high skill level). In addition, each individual was asked to indicate whether he/she has taken any computerized traffic tests before. For the current research, the self-reported level of computer skill was used as the measure for an applicant's experience.

Enjoyment. This variable refers to one's perception that taking the computerized traffic test produces positive feelings in its own right, apart from performance consequences. A three-statement scale adopted from Davis, Bagozzi and Warshaw [19] was used to measure this variable. These statements (numbered 7, 8 and 9) appear on the questionnaire under question 14. Each respondent was asked to indicate the extent to which he/she agrees with each of the three statements using a five-point numerical scale ranging from one (strongly disagree) to five (strongly agree). Summation of the scores on those three statements yielded the measure for enjoyment.

End-User Satisfaction. This variable refers to a user's attitude toward different aspect of the computerized test (e.g. clarify of information given, format of the test, sufficiency of information given, etc.). Doll and Torkzadeh [20] developed the end-user computing satisfaction instrument that consisted of 12 items dealing with five dimensions (i.e., content, accuracy, format, ease of use, and timeliness).

The current study employs this instrument but uses only the first four dimensions with two statements for each (question 15 on the questionnaire includes these eight statements). Each respondent was asked to indicate the extent of his/her satisfaction with each of the eight aspects of the computerized traffic test using a five-point numerical scale. The scale ranged from one (very dissatisfied) to five (very satisfied). Summation of the scores on those eight statements yielded the measure for end-user satisfaction.

Statistical analysis

The authors applied reliability analysis, correlation analysis, and regression to collected data. Reliability analysis (alpha analysis) was used to judge the internal consistency of each measurement scale with multiple items. Correlation analysis was used to judge the interrelation between every two independent variables in the model. Regression analysis was used to test the effect of each independent variable on the criterion (dependent) variable (the choice between a computerized traffic test and a manually written traffic test). A 95% confidence level was used and missing data were ignored. The general form of the regression model was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

where,
Y = choice of traffic test (1 for computerized test and 0 for manual test),
X_1 = perceived ease of use,
X_2 = perceived usefulness,
X_3 = user's attitude towards computerized tests,
X_4 = users' skills with computers,
X_5 = users' enjoyment of using the system,
X_6 = users' satisfaction with the system,
ε = error term.

Data Analysis and Findings

Survey responses

As mentioned in a previous section, the supervisor of the driving test center distributed 548 questionnaires to applicants who took the computerized traffic test during the period November 1, 2003 to March 31, 2004. The total number of returned questionnaires was 401 questionnaires, a response rate of 73.2%. However, the authors excluded four questionnaires from the analysis because of incomplete data.

The average respondent's age was about 29 years old. Table 1 shows the frequency distributions and percentages for the demographic variables gender, nationality, marital status, and educational level.

The table shows that more than two-thirds of the sample respondents were male and non-UAE nationals. The table also shows that the majority of respondents were married. In addition, the majority (about 50%) of respondents were holders of university degrees.

Table 1. Sample demographics

Variable	Frequency	Percentage
Gender		
Male	275	69.10%
Female	123	30.90%
Nationality		
UAE nationals	33	8.29%
Non-UAE nationals	365	91.71%
Marital Status		
Married	220	55.42%
Unmarried	177	44.58%
Educational Level		
Below high school degree	20	5.04%
High school diploma	124	31.23%
University degree	193	48.62%
Post-University degree	60	15.11%

Reliability analysis results

The authors performed reliability analysis (alpha) to judge the extent of the internal consistency of the multi-item measurement scales. Table 2 shows the obtained alpha coefficients (Cronbach alpha) for each multi-item measure.

Table 2. Reliability analysis results

Variable	Number of items	Alpha
Respondent attitude	6 items (question 13 on the questionnaire)	0.9480
Ease of use	6 items (items 1 through 6 of question 14)	0.7184
Enjoyment	3 items (items 7, 8, and 9 of question 14)	0.8850
Perceived usefulness	4 items ((items 10, 11,12, and 13 of question 14)	0.8314
End-user satisfaction	8 items (question 15 on the questionnaire)	0.8360

Table 2 above shows that obtained alpha coefficients for the measurement scales are above the minimum acceptable level of 0.70 as advocated by Price [21]. These coefficients indicate that the measures are highly reliable.

Correlation analysis results

The authors used the technique of correlation analysis to identify any significant interrelationships among the independent variables (predictors) specified in the research model. The results of the correlation analysis help the authors to decide on whether the presence of some of the model's variables is necessary or not and whether one or more of the other model's variables can compensate for the contribution of such variables when they are removed from the model. Authors usually refer to this problem as the redundancy problem or multicollinearity. Presence of multicollinearity threatens the stability of the regression model's coefficients and reduces its benefits for prediction purposes.

Table 3 shows a correlation matrix of the coefficients between each set of two independent variables. In general, these correlation coefficients indicate the strength and the direction of the association between each set of two variables. They also indicate extent of overlapping between each set of two independent variables.

Table 3. Correlation matrix of the independent variables

Independent variables	X_1	X_2	X_3	X_4	X_5
Perceived ease of use (X_1)	1				
Perceived usefulness (X_2)	* 0.106	1			
User's attitude (X_3)	0.062	**0.445	1		
User's computer skill (X_4)	**0.192	**0.366	**0.175	1	
User's enjoyment (X_5)	- 0.030	**0.245	**0.313	**0.132	1
User's satisfaction (X_6)	**0.196	0.093	- 0.012	0.018	-0.036

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

Table 3 above shows a significant correlation between the two original constructs of the technology acceptance model (perceived ease of use and perceived usefulness). But, the highest interrelation between two independent variables is the one between perceived usefulness (X_2) and user's attitude (X_3). The correlation coefficient is 0.445. This indicates the existence of some level of redundancy between these two variables. Cooper and Schindler [22, p. 617] indicate that a correlation coefficient between two independent variables at 0.80 or greater represents a serious problem for the data analysis and the authors should deal with the situation in one of two ways: (1) choose one of the two variables and delete the other, or (2) create a new variable that is a composite of the two highly inter-correlated variables and use this new variable in place of its components. Since none of the above reported correlation coefficients is high enough to cause a serious problem for the data analysis, the authors decided not to remove any of the variables from the model's specification or create a new variable that is a composite of two correlated variables. The originally selected six variables were used.

Regression results

The authors first performed two simple regression analyses to test the effect of each of the two main variables of the technology acceptance model (perceived ease of use and perceived usefulness). Table 4 shows the results of these two simple regression analyses.

Table 4. Simple regression analysis results

Variable	R^2	Beta coefficient	t-statistic	Significance
Perceived usefulness	0.156	0.395	8.549	0.000
Perceived ease of use	0.027	0.165	3.317	0.001

Table 4 shows that perceived usefulness and perceived ease of use (the two main variables of the technology acceptance model) are statistically significant ($t > 3.317$, $p < 0.001$). These results indicate that each of these variables is important to the model specification for testing its applicability to the computerized traffic test of the Emirate of Sharjah. However, the magnitude of perceived usefulness coefficient (0.395) indicates that perceived usefulness has more effect on an applicant's choice of a computerized traffic test than perceived ease of use (0.165). The positive signs of the coefficients (direction of the relationship) indicate that as perceived usefulness and/or perceived ease of use increase, the likelihood that an applicant will select a computerized test increases.

When the two main variables (perceived usefulness and perceived ease of use) entered the regression model together (one variable partialled out the effect of the other variable), the direction of the relationship between each of the two main variables and the dependent variable (an applicant's choice of a computerized traffic test) did not differ from the direction reported in Table 4. However, the values of the two coefficients decreased slightly. Table 5 shows the results of this two-variable multiple regression analysis.

Table 5. Multiple regression results for ease of use and usefulness

Variable	Change in R^2	Beta coefficient	t-statistic	Significance
Perceived usefulness	0.156	0.382	8.282	0.000
Perceived ease of use	0.015	0.124	2.688	0.007

The model's R^2 is 0.171.
The model's F value is 40.737 ($p < .0001$).

As Table 5 above shows, the change in the model's R^2 for perceived ease of use is less than its R^2 in the simple regression model, which is reported in Table 4. This indicates that a small portion of the effects of the perceived ease of use has been partialled out because of the perceived usefulness. However, the level of significance stayed almost the same. These results confirm prior studies results, e.g. [6] and [10].

The authors also performed a simultaneous multiple regression analysis including all the six independent variables specified in the regression model in the previous section. Table 6 shows the results of the simultaneous multiple regression analysis.

Table 6. Simultaneous multiple regression analysis results

Variable	Beta coefficient	t-statistic	Significance
Perceived usefulness	0.382	8.282	0.000
Perceived ease of use	0.124	2.688	0.007
User's computer skills	0.354	7.614	0.000
Attitude	0.149	3.049	0.002
Satisfaction	-0.013	-0.299	0.765
Enjoyment	-0.050	-1.095	0.274

The model's R^2 is 0.294.
The model's F value is 27.061 ($p < .0001$).

As Table 6 above shows, four of the model's variables are statistically significant ($t > 2.68$, $p < 0.007$). These variables are perceived usefulness, perceived ease of use, computer skills, and attitude. The results also show that the relationship between each of these variables and the applicant's choice to take a computerized traffic test is positive. This means that an increase in any of these variables increases the probability that an applicant will select the computerized traffic test.

The table also shows that the remaining two variables (satisfaction and enjoyment) do not have significant statistical relationships with the applicant's choice of the computerized traffic test. However, one would notice that the relationship between these two variables and the applicant's choice of the computerized traffic test is negative. This negative relationship indicates that applicants who took the computerized test were not satisfied with and did not enjoy the format and movements from one screen to another. Thus, if an applicant fails the test, it is less likely that he will select a computerized test next time.

The above reported results indicate that the original technology acceptance model as proposed by Davis [1], as well as an extended version of the model, is applicable to the case of using a computerized traffic test in the Emirate of Sharjah.

Results of testing the hypotheses

This report posited six research hypotheses. The first research hypothesis stated no significant effect for perceived ease of system use on an applicant's choice of a computerized traffic test. The results reported in Tables 4, 5 and 6 show significant effect for perceived ease of system use on an applicant's choice of a computerized traffic test. Thus, the results reject the first research hypothesis.

The second research hypothesis stated no significant effect for perceived usefulness of the system on an applicant's choice of a computerized traffic test. The results reported in Tables 4, 5 and 6 show significant effect for perceived usefulness of the system on an

applicant's choice of a computerized traffic test. Thus, the results reject the second research hypothesis.

The third research hypothesis stated no significant effect for the applicant's level of computer skills on his/her choice of a computerized traffic test. The results reported in Table 6 show significant effect for the applicant's level of computer skills on his/her choice of a computerized traffic test. Thus, the results reject the third research hypothesis.

The fourth research hypothesis stated no significant effect for the applicant's attitude towards the system on his/her choice of a computerized traffic test. The results reported in Table 6 show significant effect for the applicant's attitude on his/her choice of a computerized traffic test. Thus, the results reject the fourth research hypothesis.

The fifth research hypothesis stated no significant effect for the applicant's enjoyment level of the system on his/her choice of a computerized traffic test. The results reported in Table 6 show insignificant effect for the applicant's enjoyment of the system on his/her choice of a computerized traffic test. Thus, the results fail to reject the fifth research hypothesis.

The sixth research hypothesis stated no significant effect for the applicant's level of satisfaction on his/her choice of a computerized traffic test. The results reported in Table 6 show insignificant effect for the applicant's level of satisfaction on his/her choice of a computerized traffic test. Thus, the results fail to reject the sixth research hypothesis.

Conclusions and Recommendations

This study applied the Technology Acceptance Model (in its original form and in an extended form) to the case of the computerized traffic test administered in the Emirate of Sharjah. The authors used the choice-decision between the two forms of the test as the measure for the system usage.

The two main variables of the model (perceived ease of use and perceived usefulness) were used as the main independent variables along with some additional variables that have been suggested in the literature as possible extensions to the model. These additional variables included an applicant's computer skills, attitude towards the traffic tests, enjoyment of the system, and the user's satisfaction with the system.

The results indicate significant correlation between perceived usefulness and perceived ease of use (the two main variables of the TAM). In addition, the results show significant positive effects for perceived usefulness, perceived ease of use, attitude, and computer skills on the applicant's choice of the computerized traffic test. However, there were no significant effects for the level of satisfaction with the system and enjoyment of the system on the applicant's choice of the computerized traffic test.

The above results have some implications for the Traffic Department. First, they provide evidence that the department is moving in the right direction and the eventuality of generalizing computerized traffic tests. Second, the results indicate that the department needs to continue to experiment with these computerized tests for a longer period of time.

Based on the above reported results, the authors make three main conclusions. First, the technology acceptance model works well in the case of the computerized traffic test in its original form (two main variables). Second, extending the technology acceptance model to include additional variables such as the user's computer skills and attitude increased the prediction power of the model. Third, the negative effects of satisfaction and enjoyment on the applicant's choice of the computerized traffic test (although not statistically significant) lead the researcher to conclude that the design of the system (e.g. format, contents, and movements between the screens) may need some modifications.

The above results are subject to some limitations. First, as the case with any questionnaire-based study, direct verification of the level of accuracy of opinion and attitude data is simply not possible. Such studies rely on the assumption that respondents are honest and that they report their true opinions and attitudes. Second, the sample was selected from among applicants of few months. In such a case, the validity of the results depends on the extent to which those applicants represent the population. It is possible that applicants of other months possess different characteristics or have different attitudes that may affect the results. However, the large sample size and the selection procedures may partially mitigate such possible effects. Third, the authors used a model with six variables that assumes linear relationship. It is possible that other external variables, not included in the model, may affect the applicants' choices of computerized traffic tests. It is also possible that the model may take other forms than the linear one. All such possibilities may affect the degree of generalizing the results to other samples or other populations of interests.

Based on the study results, the authors make some recommendations. They first recommend re-examination of the design of the test to improve the applicants' levels of enjoyment and satisfaction with the system. Second, they recommend offering some demonstrations and examples of the computerized test online for applicants training and practice before they actually take the test. This training would increase the applicants' acceptance of the technology. Third, the authors recommend replications of this study in other emirates or other Gulf States, where computerized tests are used, to be able to compare the results of the TAM applicability to the computerized traffic test. Finally, future research may address the problem of traffic accidents in relation to the type of traffic test (manual or computerized) administered to drivers involved in accidents.

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Appendix

1. Please indicate your age:

_____ years

2. Please indicate your gender:

□ Female □ Male

3. Please indicate your nationality:

□ UAE National □ Non-UAE National

4. Please indicate your marital status:

□ Married □ Unmarried

5. Please indicate your highest educational level:

□ Below high school degree
□ High school degree
□ University degree
□ Post-university degree (graduate studies)

6. Do you use a computer at work?

□ Yes □ No

7. Do you use a computer at home?
□ Yes □ No

8. On average, how many hours per day do you use computers (both at work and at home?
_____ hours

9. Please indicate your current *skill level* in using computer by circling a number on the scale below:

Low.....High
1 2 3 4 5

10. How long have you used computers?

_____ years

11. Have you ever taken a computerized traffic test in other countries?

□ Yes □ No

12. If you were given a choice between taking a manual written traffic test and a computerized test, which one would you prefer to take?

□ Manual written traffic test □ Computerized test

13. All things considered, please make *a cross mark* in the place that best describe your opinion about the computerized traffic test:

Bad	_____:_____:_____:_____:_____	Good
Foolish	_____:_____:_____:_____:_____	Wise
Unfavorable	_____:_____:_____:_____:_____	Favorable
Harmful	_____:_____:_____:_____:_____	Beneficial
Negative	_____:_____:_____:_____:_____	Positive
Not useful	_____:_____:_____:_____:_____	Useful

14. Please indicate the extent to which you agree or disagree with each of the following statements by placing (√) in the appropriate column using the following scale:

Strongly Disagree				**Strongly Agree**
1	2	3	4	5

	Statements	**1**	**2**	**3**	**4**	**5**
1	I believe that computerized traffic tests are cumbersome to use					
2	Learning to use computerized traffic tests was easy for me					
3	Taking a computerized traffic test was frustrating for me					
4	Taking a computerized traffic test required a lot of mental effort					
5	Instructions and images on the screen were clear and understandable					
6	It was easy to move from one test screen to another					
7	Taking a computerized traffic test was enjoyable					
8	The actual process of taking the computerized traffic test is pleasant					
9	I had fun taking the computerized traffic test					
10	Using computers improves my traffic test performance					
11	Using computers increases my productivity					
12	I find computers useful for the traffic test					
13	Using computers enhances my effectiveness					

15. Please indicate the level of your satisfaction with each of the following aspects of the computerized traffic test using the scale below:

Very Dissatisfied **Very Satisfied**

1 2 3 4 5

	1	2	3	4	5
Sufficiency of information given					
Clarity of information given					
Accuracy of scoring					
Precision of questions asked					
Format of the test					
Screen colors					
Easiness to use					
The design was user friendly					

16. Overall, how satisfied are you with the computerized traffic test? Please circle one number on the scale below.

Very Dissatisfied **Very Satisfied**

1 2 3 4 5

17. Please indicate the extent to which each of the following contributed to your knowledge about the computerized traffic test using the following scale:

None **Too Much**

0 1 2 3 4 5

	0	1	2	3	4	5
A trainer explained the test's features						
A staff of the traffic department explained the test's features						
A computer expert explained the test's features						
A course on traffic tests covered the tests feature						
A self tutorial package on traffic tests						
Attempting the computerized test multiple times						

Thank you for your co-operation

تطبيق نموذج قبول التقنيات على اختبارات المرور باستخدام الحاسب الآلي في إمارة الشارقة

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(قدم للنشر في ١٤٢٥/٨/١٢هـ؛ وقبل للنشر في ١٤٢٧/١٠/١٧هـ)

ملخص البحث. تتناول هذه الدراسة تطبيق نموذج قبول التقنيات (في صورتيه الأصلية والمعدلة) على حالة اختبارات المرور باستخدام الحاسب الآلي في إمارة الشارقة، وقد قام الباحثون بجمع البيانات باستخدام نموذج استبيان لعينة من ٣٩٧ متقدم لأداء الاختبار، وذلك خلال فترة زمنية بلغت خمسة شهور. وتم تحليل البيانات باستخدام الإحصاء الوصفي، وتحليل الاعتمادية، وتحليلات الارتباط والانحدار.

وأوضحت النتائج ارتباطا ملحوظا بين إدراك أهمية استخدام الحاسب الآلي وسهولة استخدامه (وهما المتغيران الرئيسان في نموذج قبول التقنيات) في أداء اختبارات المرور، كما أظهرت النتائج تأثيرا إيجابيا لأهمية وسهولة استخدام الحاسب الآلي، ومهارات المتقدم للاختبار في استخدام الحاسب الآلي على اختيار أداء الاختبار يدويا أو باستخدام الحاسب.

وعلى الرغم من ذلك لم يكن هناك تأثير واضح لمستوى الرضا على النظام أو الاستمتاع باستخدامه على اختيار المتقدم لأداء الاختبار باستخدام الحاسب.

الكلمات المفتاحية: اختبارات المرور، نظم المعلومات، تقنيات، قبول التقنيات.