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EXTENDING THE CHIN AND LEE'S END USER COMPUTING SATISFACTION MODEL WITH THE TASK-TECHNOLOGY FIT MODEL

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Abstract

The measurement of satisfaction has had a long history within the IS discipline. In general, most early studies focused only on the characteristics of the system, without trying to understand the process of the formation of satisfaction.

This research focuses on combining the two theories of user satisfaction from the world of information technology. The first theory is Chin and Lee's end user computing satisfaction model that explains the formation process of user satisfaction from expectation and desire. The second theory is Task-Technology Fit model explains the fit between user's task with the support of information technology. The theoretical combination between the two theories was validated using datasets from field tests.

Keywords :

end-user computing satisfaction, expectation, desire, task-technology fit.

INTRODUCTION

Measurement of user satisfaction has a long history in the discipline of information systems (Chin & Lee 2000). Khalifa and Liu (2004) said that research on the satisfaction of information systems has been and will continue to attract the interest of researchers and practitioners.

Chin and Lee's EUCS is the theory that explains the formation process of user satisfaction from the point of view of expectation and desires (Khalifa & Liu 2002). But, this theory only describe user satisfaction from user's point of view (Leclercq 2007) which is intrinsic factor for EUCS. Whereas, the extrinsic factor itself had not covered by Chin and Lee's theory. This study proposes Task-Technology Fit model as the extrinsic factor for EUCS.

The purpose of this paper is combining two theories of user satisfaction which comes from the world of information technology. The theory is Chin and Lee's End-User Computing Satisfaction (EUCS) model (Chin &Lee2000) with Task-Technology Fit (TTF) model (Goodhue&Thompson1995).

The research question is whether the combination of these theories will increase the predictive power (i.e. an indicator of how accurately the research models in predicting future output based on existing data) of them both?

THEORETICAL FOUNDATIONS OF THE STUDY

Chin And Lee's End User Computing Satisfaction Model

Chin and Lee (2000) proposes an alternative model of EUCS. This model was based on the expectation-disconfirmation theory (EDT), and it was applied to the context of web-based information system supported working environment. In this model, they are arguing that the formation process of EUCS are entirely influenced

by expectation and desire. The formation process of expectation and desire was based on work by Doll and Torkzadeh's (1988) EUCS set of measures and an additional variable, i.e. satisfaction with the system speed.

Central to Chin and Lee's EUCS model is the notion of disconfirmation (Chin & Lee 2000). Essentially, they view satisfaction as being formed by the amount of gap between post hoc perceptions of the system and a prior standard. Previous research has traditionally used expectations as the standard for comparison (Churchill & Carol 1982). Chin and Lee extends the notion of gap between prior expectations and post hoc perceptions to include the role of desires.

Task-Technology Fit Model

Central to Task-Technology Fit (TTF) model is a formal construct known as Task-Technology Fit. This construct provide the suitability of technology capability toward the need of task in work. In other words, TTF is the ability of information technology for giving support to work. (Goodhue & Thompson 1995a).

TTF model have four key constructs, such as Task Characteristics, Technology Characteristics that influences the third construct, i.e. Task-Technology Fit. These three constructs influence outcome variable, i.e. Performance or Utilization. Beside these four key constucts, TTF also have additional construct that is Individual Abilities (Goodhue & Thompson 1995a). Individual abilities are usually associated with the use of information technology at the higher level. TTF Model states that information technology will be used if and only if the function and the benefit is provided for supporting user's activity.

Dishaw et al. (2002) state that TTF model use clearly rational approach with assumption that user choose to use information technology that give them benefits (such as increased job performance) regardless of user's attitudes toward information technology.

The relationship between EUCS model and TTF model

TTF model is created with the purpose of measuring the success of information system. But, it can be used for measuring user satisfaction of information system by making the constructs in TTF as antecedent for the EUCS constructs. Assefa and Prybutok (2006) argued that when task characteristic, technology characteristic and individual abilities (as key construct in TTF) have a good level of harmony, it will increase end user satisfaction.

Chin and Lee (2000) only provide a complete set of measures for future empirical testing. They have not doing any empirical testing yet against their model. Meanwhile, Goodhue and Thompson (1995) did three regression analyses (see Table 1) for measuring predictive power of task-technology fit (TTF) as presented in table 1.

Table 1. Result of Regression Analyses

Three Models of TTF	R-Square
Utilization only	0.04
TTF only.	0.14
Utilization and TTF	0.16

Expectation and desire as intrinsic factor and task-technology fit as extrinsic factor for end-user computing satisfaction

Herzberg's two factor theory saw individual's job satisfaction resulting from the presence of intrinsic factors (motivators) and individual's job dissatisfaction stems from not having extrinsic factor (Gerber, 2003).

Motivator is something that motivates us or gives motivation. Vroom (1964) defined motivation as a product from three things : individual's expectation that certain effort will lead to perceived performance, the use of performance as a tool for achieving central result, and someone's desire in getting something. Based on Vroom's definition, we argue that expectation and desires are part of motivation or intrinsic factor.

Goodhue and Thompson (1995) defined task-technology fit as the extention of technology functionality that fit with the need of task and individual abilities. In the other side, Mullany et al. (2006) argued that tools (technology and its functionality) that were used in workplace by someone that have experience in using it is part of the user's work environment and because of that these tools play important role in fullfilling hygiene factors. From the above arguments, we argue that task-technology fit is hygiene factors for end-user computing satisfaction.

Herzberg's two factor theory has been used in the field of information system research. For example, Zhang and Dran (2000) use this theory for evaluating and designing website. Seeing this fact, this paper try to implement

Herzberg's two-factor theory in the field of end-user computing satisfaction by arguing that the Chin and Lee's model is an intrinsic factor and the task-technology fit model is an extrinsic factor (see Figure 1 for the complete research model).

The explanation of research model

For this study (see Figure 1), we argue that overall user satisfaction with information system emerged as the results of direct impact of the existence of expectation based satisfaction, desire based satisfaction and task-technology fit based satisfaction.

Expectation based satisfaction is formed by overall discrepancy between user's prior expectation (before using system) and user's post-hoc perceptions (after using system).

Desire based satisfaction is formed by overall discrepancy between user's prior desire (before using system) and user's post-hoc perceptions (after using system).

Task-technology fit based satisfaction is a construct formed by task-technlogy fit (the suitability between the technology capability of information system and the user's task that must be supported by the technology).

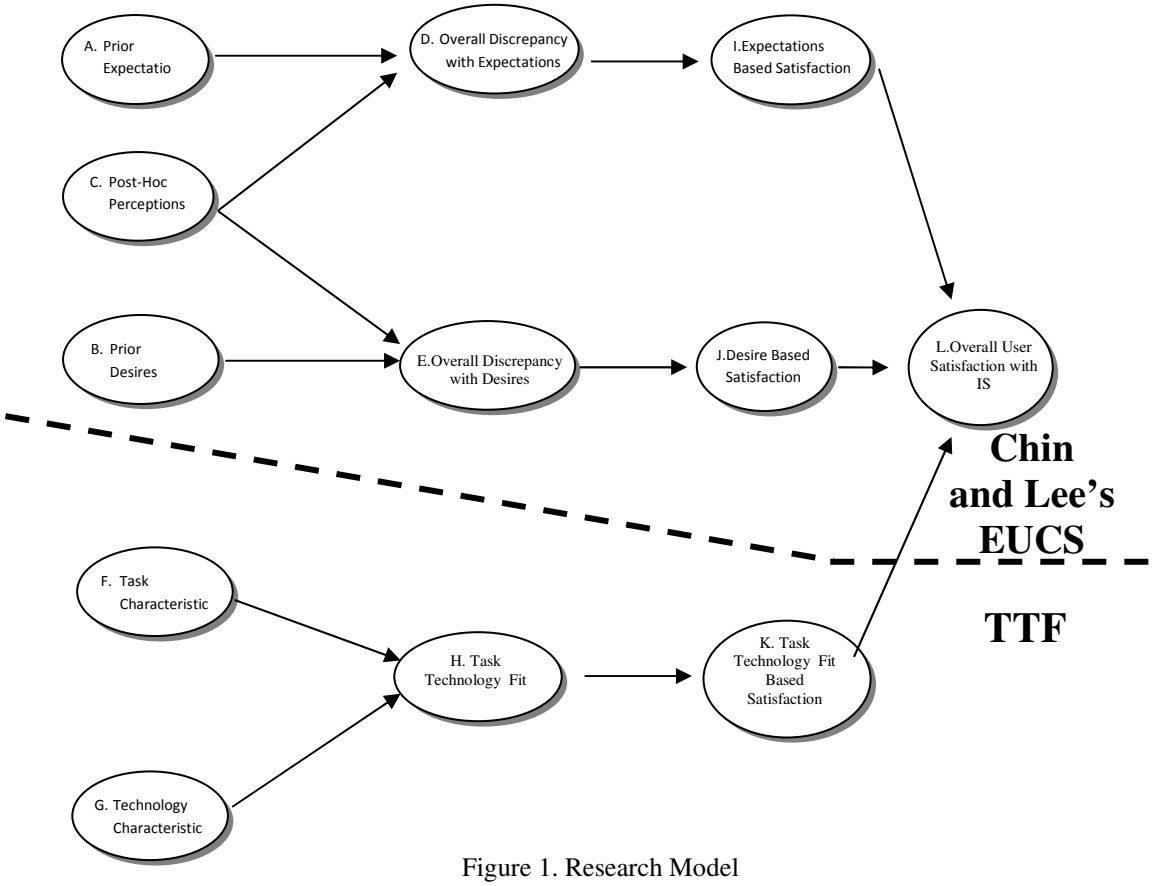

Figure 1. Research Model

RESEARCH METHODOLOGY

Measurement Development

The research model is validated through a card sorting mechanism and longitudinal online survey study (in this research, we define satisfaction only by gathering quantitative data). Card sorting mechanism was used for getting Cohen's Kappa score in measuring inter-rater reliabilities (Vanessa 2005). It was an open procedure (Spencer 2004) and was conducted in just one round. There were three judges who were asked to group 54 items/manifests into 12 constructs.

The online survey was administered to the lecturers, students and the staff as the user of an academic information system of a university in Indonesia. The university consists of over 5000 students, 200 lecturers and 100 administrative staff who are using academic information system for different purposes. The number of respondents participated on the survey was 84 person comprises18 lecturers, 4 staff and 62 students.

Data Analysis

The result of the inter-rater reliabilities is presented in Table 2. For Cohen's Kappa, there are no strict authority dictating the required scores (Vanessa 2005) but Moore and Benbasat (1991) stated that in the early stage of a study, Cohen's Kappa scores ranging 0.50 till 0.60 is sufficient. A total average Kappa score of 0.605 (above 0.60) demonstrated fair inter-rater reliabilities of the items. These findings established that the reliability issue for the items was adequately addressed.

Table 2. Result of Inter-rater reliabilities

Rater		Cohen's Kappa Coefficient
A	B	0.652
A	C	0.623
B	C	0.540
Total average		0.605

The data analysis was done using Partial Least Squares. This paper use 5 parameters to test the research model empirically such as: item reliability, construct reliability, discriminant validity, internal consistency and predictive power.

The standard approach for the evaluation of item reliability, path loadings from construct to manifest exceed 0.70, was used by Khalifa and Liu (2002). For checking construct reliability, we relied on composite reliability and cronbach alpha (Simon 2008). We tested discriminant validity by comparing the square root of the average variance extracted (AVE) for a particular construct to its correlations with the other constructs (Vanessa 2005). To measure internal consistency, we also use AVE (Vanessa 2005). Finally, for measuring predictive power, we use R-Square (Griffiths 2009) and t-test.

Table 3 presents the construct reliability, internal concistency and predictive power. All constructs showed very high composite reliability and cronbach alpha values. The square root of AVE score for all construct were also higher than 0.5. According to Vanessa (2005) this square root of AVE score is accepted. The predictive power of this model is 0.66 (very good since it is higher than 0.5).

Table 3. Measurement Model Statistics

Variables / Constructs	R-Square	Cronbach Alpha	Composite Reliability	AVE
Prior Expectations	-	0.956	0.956	0.784
Prior Desires	-	0.971	0.974	0.862
Post-Hoc Perceptions	-	0.950	0.959	0.770
Overall Discrepancy with Expectations	0.760	0.942	0.954	0.777
Overall Discrepancy with Desires	0.743	0.958	0.966	0.826
Task Characteristic	-	0.916	0.916	0.734
Technology Characteristic	-	0.940	0.955	0.809
Task Technology Fit	0.840	0.958	0.966	0.826
Expectation based Satisfaction	0.353	0.914	0.959	0.921
Desire based Satisfaction	0.374	0.910	0.957	0.917
Task-technology fit based Satisfaction	0.562	0.875	0.941	0.889
Overall User Satisfaction with IS	0.661	0.891	0.948	0.901

Table 4 presents the result for item reliability. From Table 4, we can see that there is none of the manifests that has loading factor below 0.5. This findings established that all manifests have high reliability level.

Table 4. The Loading Factor for all manifests

Construct	Manifests	Loading Factor
Prior Expectations	a1,a2,a3,a4,a5,a6	0.862; 0.903; 0.932; 0.921; 0.969; 0.701
Prior Desires	b1,b2,b3,b4,b5,b6	0.925; 0.942; 0.958; 0.932; 0.889; 0.922
Post-Hoc Perceptions	c1,c2,c3,c4,c5,c6,c7	0.903; 0.888; 0.857; 0.874; 0.915; 0.833; 0.870
Overall Discrepancy with Expectations	d1,d2,d3,d4,d5,d6	0.880; 0.911; 0.911; 0.843; 0.890; 0.850
Overall Discrepancy with Desires	e1,e2,e3,e4,e5,e6	0.893; 0.919; 0.906; 0.919; 0.896; 0.920
Task Characteristic	f1,f2,f3,f4	0.918; 0.975; 0.723; 0.788
Technology Characteristic	g1,g2,g3,g4,g5	0.876; 0.849; 0.932; 0.926; 0.910
Task-Technology Fit	h1,h2,h3,h4,h5,h6	0.898; 0.873; 0.933; 0.934; 0.914; 0.898
Expectation-Based Satisfaction	i1,i2	0.960; 0.959
Desire-Based Satisfaction	j1,j2	0.956; 0.960
Task Technology-Based Satisfaction	k1,k2	0.940; 0.946
Overall User Satisfaction with IS	l1,l2	0.946; 0.953

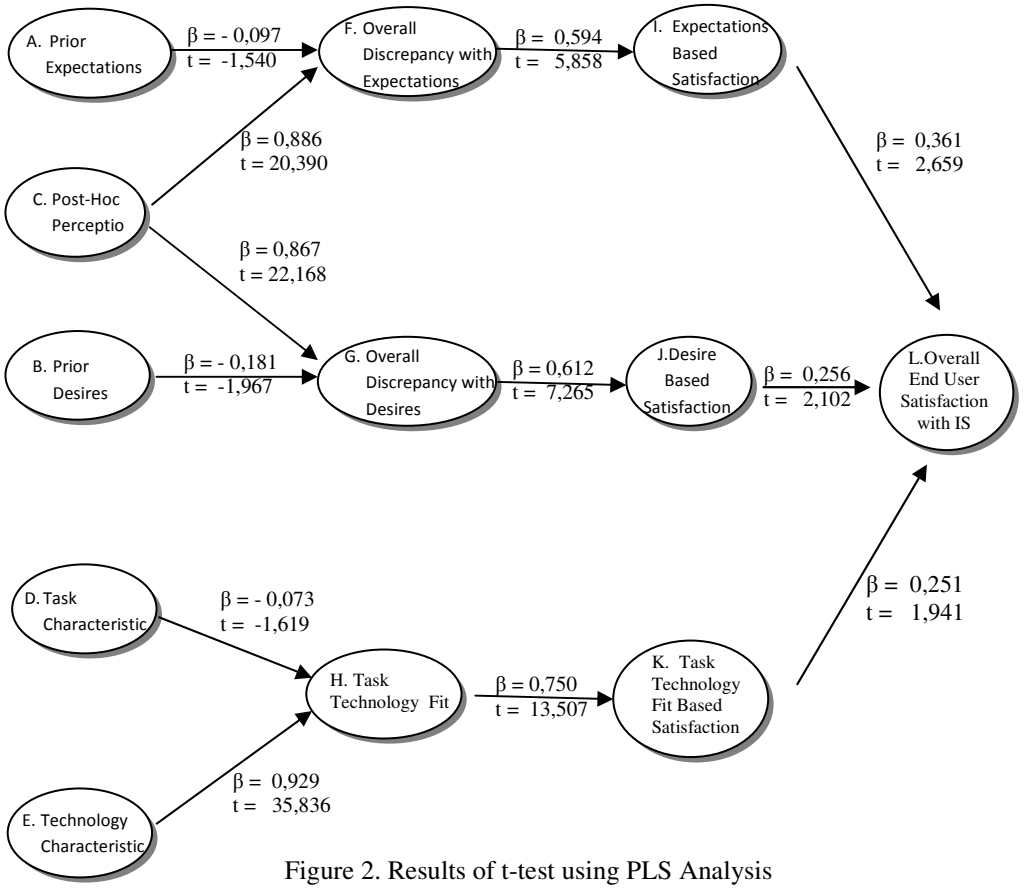

Figure 2. Results of t-test using PLS Analysis

Table 5 presents the result for discriminant validity. We can see that AVE score for each particular construct is higher than its correlations with the other constructs. This finding shows that the manifests from different constructs were discriminated (Trochim 2006).

Beside using R-Square, this paper also use t-test in measuring predictive power. T-test is conducted with α = 0.05 and t-table values = 2.1788 . From Figure 2, we can see that there are five path (A → F, B → G, D → H, J → L, K → L) which have t-statistic values lower than t-table values.

Discussion

The addition of TTF model into Chin and Lee's EUCS model increase the predictive power from both models (see Table 6) from undefined and 0.16 become 0.66.

Goodhue and Thompson (1995) measure the R-Square of TTF model towards 600 individual who used 25 different information technology and work in 26 different department in two company. Whereas Chin and Lee measure the R-Square of their model towards 200 university's staff regarded their satisfaction with an online grading system. Thus. there is a similarity between our research object, Chin and Lee's research object and also Goodhue and Thompson's research object. The similarity is: used in work-related environment, system usage is mandatory and the information resources is reliable. Seeing the similarities of these three research object, then the comparison of R-Square score among these three models becomes possible.

Table 5. Discriminant Validity Statistics

	Prior Expectation	Prior Desires	Post-Hoc Perceptions	Overall Discrepancy With Expectations	Overall Discrepancy With Desires	Task Characteristic	Technology Characteristic	Task Technology Fit	Expectation Based Satisfaction	Desire Based Satisfactiom	Task Technology Fit Based Satisfaction	Overall User Satisfaction With IS
Prior Expectations	1.0	0.9	0.2	0.1	-0.0				-0.0	0.0		-0.0
Prior Desires		1.0	0.1	0.03	-0.0				-0.1	0.0		-0.1
Post-Hoc Perceptions			1.0	0.9	0.8				0.6	0.6		0.6
Overall Discrepancy with Expectations				1.0	0.9				0.6	0.6		
Overall Discrepancy with Desires					1.0				0.7	0.6		
Task Characteristic	0.0	0.03	0.3	0.3	0,3	1.0			0.0	0.0		0.0
Technology Characteristic	-0.0	-0.1	0.7	0.8	0.8	0.2	1.0	0.9	0.8	0.7	0.7	0.7
Task-Technology Fit	-0.0	-0.1	0.6	0.7	0.7	0.1		1.0	0.8	0.7		0.7
Expectation-Based Satisfaction									1.0	0.8		
Desire-Based Satisfaction										1.0		
Task Technology Fit - Based Satisfaction	-0.1	-0.1	0.5	0.6	0.6	0.1		0.8	0.8	0.8	1.0	0.7
Overall User Satisfaction with IS				0.7	0.6				0.8	0.8		1.0

Table 6. The comparison of the R-Square for many models

Models	R-Square
Chin and Lee's EUCS	Undefined
Utilization only	0.04
TTF only.	0.14
Utilization and TTF	0.16
Chin and Lee's EUCS combined with TTF	0.66

CONCLUSION

This research offers the alternative model in measuring end user computing satisfaction which cover extrinsic and intrinsic factor from the user. Altough the combination of Chin and Lee's EUCS and task-technology fit

have good validity and reliability level, the deeper research is still need for investigating some path which have lower t-statistic values.

FUTURE WORK

For getting more precise definition about satisfaction, the survey instrument in this study must be supplemented with exclusive interview. The purpose of this interview is collecting the qualitative information.

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APPENDIX 1. INSTRUMENT TO MEASURE END USER COMPUTING SATISFACTION AND ANTECEDENT FACTORS

1) I expect system have complete information content.
2) I expect the information that system produce is accurate.
3) I expect the information that system produce is in time.
4) I expect the format of the information that is diplayed by system is clear.
5) I expect system is easy to use.
6) I expect system can finish fastly the tasks which i gave.
7) I want system has complete information content.
8) I want the information that system produce is accurate.
9) I want the information that system produce is in time.
10) I want the format of the information that is diplayed by system is clear.
11) I want system is easy to use.
12) I want system can finish fastly the tasks which i gave.
13) system has provided complete information.
14) system has provided accurate information.
15) system has provided the information in time.
16) The output of system has presented in useful format.
17) The output of system has presented in clear format.
18) system is easy to use.
19) system can finish fastly the tasks which i gave.
20) The information content which is provided by system fit with my expectation.
21) The accuracy of the information which is provided by system fit with my expectation.
22) The timeliness of the information which is provided by system fit with my expectation.
23) The format of the information which is provided by system fit with my expectation.
24) The ease of use of the information which is provided by system fit with my expectation.
25) The speed of operation which is perform by system in completing the tasks that is given fit with my expectation.
26) The information content which is provided by system fit with my desire.
27) The accuracy of the information which is provided by system fit with my desire.
28) The timeliness of the information which is provided by system fit with my desire.
29) The format of the information which is provided by system fit with my desire.
30) The ease of use of the information which is provided by system fit with my desire.
31) The speed of operation which is perform by system in completing the tasks that is given fit with my desire.
32) I frequently deal with nonroutine tasks.
33) I frequently work on tasks which involve answering questions that have never been asked in quite that form before.
34) The tasks that I deal with frequently involve more than one business function.
35) The tasks that I deal with frequently involve more than one organization group.
36) system makes me easy in finding newest data.
37) system makes me can finish the task in a timely manner.
38) After using system for doing tasks, i become more productive.
39) After using system for doing tasks, i become more creative.
40) system helps me in doing business processes smoothly.
41) system is suitable for completing my non routine tasks.
42) system is suitable with my need for gathering information.
43) system is suitable with my need for analyzing information.
44) system is suitable with my need for evaluating information.
45) system is suitable with my need for running all business processes.
46) system is suitable with my need for collaborating with other people in organization.
47) I am pleased with the ability of system that exceed all things that i expect from system.
48) The ability of system has exceed all things that i expect from system.

49) I am pleased with the ability of system that exceed all things that i want from system.
50) The ability of system has exceed all things that i want from system.
51) I am pleased with system that can give maximum support to all task that i must done.
52) system can give maximum support to all task that i must done.
53) I am pleased using the current version of system.
54) I am comfort using the current version of system.

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