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**New End-user Computing Satisfaction Model for
Computerized Accounting System: Selected
Accounting Firms**

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Abstract

Over the years, technology has brought a drastic effect on businesses through different information systems, like Computerized Accounting Systems. The COVID-19 pandemic has caused more enterprises to engage in automated operations, as the pandemic compelled them to move to a work from home setup. An End-User Computing Satisfaction model was introduced to measure the effectiveness of these systems. The continuous development of technology warranted the need to modify the model. With various issues and threats in the use of information systems, it is vital to include system security as an additional independent factor together with the user expectation. The study developed a new model for the Computerized Accounting System using triangulation mixed-method, and confirmatory factor analysis to analyze and interpret the data. The respondents of the study were determined through snowball sampling. The study conducted a structured interview with selected Information Technology developers and surveyed the accountants in the Accredited Accounting Firms/Partnerships in the National Capital Region. The data gathered along with the theories and frameworks

were utilized in designing the new model. The analysis of the data together with the perception of the developers showed that the proposed model exhibited an excellent level of reliability and can effectively measure End-User Computing Satisfaction using the nine factors. The study has shown strong evidence that the proposed new model is valid and can be used in evaluating the effectiveness and efficiency of the System.

Keywords: End-User Computing Satisfaction (EUCS), Computerized Accounting System (CAS), Confirmatory Factor Analysis, System Security, User Expectation

Over the years, computerized information systems (CIS) have become an integral part of different industries as technology continuously grows. The patent innovations and technological changes brought about by the drastic and extensive development of technology throughout the years are indeed impacting the corporate world.

One of the areas that mirrors this leap in technology is the business sector which generally uses CIS, that includes computerized accounting systems (CAS). This CAS requires continuous evaluation to ensure its efficiency and effectiveness.

Due to the difficulty of evaluating the effectiveness and quality of an information system, several researchers were pushed to develop an indirect way to evaluate information systems (IS). A part of these indirect methods is the End-User Computing Satisfaction (EUCS) model, which ascertains the efficiency and effectiveness of a system by generating the end-user's satisfaction with the information system. This framework involves five factors that impact the satisfaction of the user. These elements are accuracy, content, ease of use, format, and timeliness (Doll & Torkezadeh, 1988). Further modification has been proposed by other scholars. Chin and Lee (2000) incorporated speed, whereas Ilias and Razak (2011) included reliability as an additional factor that affects the computing satisfaction of the end-user. However,

the present EUCS model fails to include other factors that the current study believes to be rightfully considered in assessing user satisfaction, such as the security of the system and user expectations.

The increasing security issues that threaten business performance, which may lead to a possible economic downfall, necessitate the inclusion of systems security in identifying customer satisfaction. In 2016, there were an estimated 42.8 million security incidents that were significant issues compared to the previous years (PricewaterhouseCoopers, 2017). In 2019, the cases of security breaches doubled in the prior year (Owaida, 2021). It was projected that in 2025 the security breach would cost an economic downfall of almost \$10.5 Trillion Annually (Sausalito, 2021). IBM (2020) investigated that as of 2020, the average cost of a security breach is \$3.86 million annually. It is also noted that cyber security issues have become more sophisticated and complicated.

Various claims by other researchers regarding the link between perceived usefulness and experience in satisfaction made the study lead to the hypothesis that user expectations must also be included. This is because satisfaction is the product of experience and expectation. The acceptance and continuance of the usage of CAS are highly dependent on satisfaction. Consequently, the perception or expectation of the user affects their behavior towards the acceptance and continuance of using their CAS (Oliver, 1980).

The main issues in this study are the validity of the proposed EUCS model and IT developers' perceptions of the factors included in the new EUCS model. The former ascertains how well the new EUCS model fits, the internal consistency of each factor, the theoretical basis of the model, and how well the factors measure the latent variable.

This study is critical because it will provide a new theoretical perspective on assessing the effectiveness of CAS. This may aid the growing number of organizations involved with CAS in improving their systems. This study proposed a new EUCS model for CAS in the Philippines, citing a lack of research on EUCS in the country. The following people would benefit from the findings of this study: company management, IT developers, end users, and future researchers.

The study only covered the accountants who work at any of the National Capital Region (NCR) Accredited Accounting firms found in the February 2021 Professional Regulatory Commission (PRC) list and who utilize CAS in the fulfillment of their work. The participants, on the other hand, only included IT and developers with experience in the development of a computerized accounting system. The data gathering was conducted from August 2021 to November 2021. The COVID-19 pandemic forced business firms to operate on a work-from-home setup that impeded the data gathering from immediately receiving the responses of the participants within the time frame. Delayed receipt forced the study to exclude some firms from the roster of respondents. The data-gathering phase also coincided with the busy season for accounting firms. Because of this, despite their consent to conduct a survey, the responses of the participating firms that failed to make the deadline were excluded.

Review of Related Literature

End-User Computing Satisfaction Model (EUCS)

The drastic change brought by technology to the business sector is seen in the immense part that computers and EUC applications play in the said industry (Barnes & Hill, 2011). These changes make measuring the effectiveness of these systems vital. To address this demand, the End-User Computing Satisfaction (EUCS) model, which assesses the computing satisfaction of the end-user towards the information system (IS), was conceptualized.

The End-User Computing Satisfaction Model, first proposed by Doll and Torkzadeh (1988), involves five original factors, namely *accuracy*, *content*, *ease of use*, *format*, and *timeliness*.

The *accuracy* factor helps in avoiding issues and inaccuracies that may arise in an Information System (IS) that may lead to inaccurate forecasts and decisions (Alsufy, 2019). The *content* of an IS refers to the scope of information and functions that a system can provide to meet the needs of users by increasing the efficiency and effectiveness of their tasks (Boell & Cecez-Kecmanovic, 2015; Fontinelle, 2021). *Ease of use* pertains to the system's accessibility and ability to be utilized using only minimal effort, making their work more convenient (Davis, 1989; Mai *et al.*, 2013). *Format* is how the system displays its contents in a creative and orderly manner (Doll & Torkzadeh, 1988; Ramirez Correa *et al.*, 2018). *Timeliness* is the ability of the system to present relevant information in real-time, including when it is expected to be available and when it becomes accessible to users (Ghahramani *et al.*, 2017; Setiawan *et al.*, 2017).

The initial EUCS model was laid out by Doll and Torkzadeh (1988) with Chin and Lee (2000), and Ilias and Razak (2011) proposing additional factors called *speed and reliability*, respectively, to further improve the model as time passed. The *speed* factor refers to how fast the information is being processed and the ability to quickly provide the needed information (Azwar *et al.*, 2020), and the system software *reliability* refers to the likelihood that a system will function properly and without error (Sridevi *et al.*, 2012). Aggelidis and Chatzoglou (2012) and Fong and Ho (2014), presented a new EUCS model by supplementing the initial EUCS model with other theories like the Information System Success Model and Expectancy Confirmation Theory.

The EUCS model's role in measuring the effectiveness of an information system through the satisfaction levels of the end-users is seen in its application in different kinds of systems like the CAS. CAS plays a role in automating the accounting

process (Shiraj, 2015) and also aids in producing accurate and pertinent financial information and increases productivity due to automation (Genil, 2013).

System security

As technology progresses in today's era, computer security threats become more apparent, and no business is safe. Technological advancement has opened the door for cybercriminals to exploit companies' CAS. Threats that are typical risks to CAS include intellectual property theft, illegal access by outsiders, employee fraud of right to internet access, and viruses (Tanya *et al.*, 2018). Moreover, Bansah (2018) categorized the particular causes of risk into three categories for simplicity of assessment: actions of employees, weakness in security system and preventive measures, and weakness in standards and controls. The action of employees refers to the security awareness of the end-users. It is noted that 50% to 70% of cyber security issues are due to employee negligence (Ernst and Young, 2003; Siponen and Vance, 2010). Thus, one method of minimizing cyber security threats is proper training and awareness of the end-users. In addition, security awareness became an integral part of the company's security protocol (Bulgurcu *et al.*, 2010; Al-Omari *et al.*, 2012). Maintaining a high level of awareness means that the end-user can acknowledge security breach issues and address the threats accordingly (Park *et al.*, 2019). However, the action of the employees would be counterproductive if system security is not effective.

System security is a significant factor in a Computerised Accounting System since it safeguards information by surpassing the borderline of information security (Sihombing *et al.*, 2018). This system security depends on the convergence of CIA or the "confidentiality, integrity, and accessibility" of the data. These three ingredients are considered the core of system security, making it vital in a CAS (Bourgeois & Bourgeois, 2014). The confidentiality aspect refers to the capability of the system to keep the data or information for authorized personnel only. Data integrity means that the system can prevent intruders from

modifying or altering the data. At the same time, accessibility is used to assure that the system can be accessed only by the specified users (Bourgeois & Bourgeois, 2014; Popescul, 2011).

Establishing the trust of the end-user in the CAS is vital. As noted by Kassim *et al.* (2012), positive feedback or satisfaction with the system is a product of the personal feeling of the end-user towards the security system. The system must keep the user feel safe and secured when accessing the system. Furthermore, end-user attention to information security is influenced by a variety of organizational and personal variables, including technical expertise, emotional experiences, and satisfaction with system security (Stanton *et al.*, 2004). Thus, system security can be considered a factor that affects end-user satisfaction.

User expectation

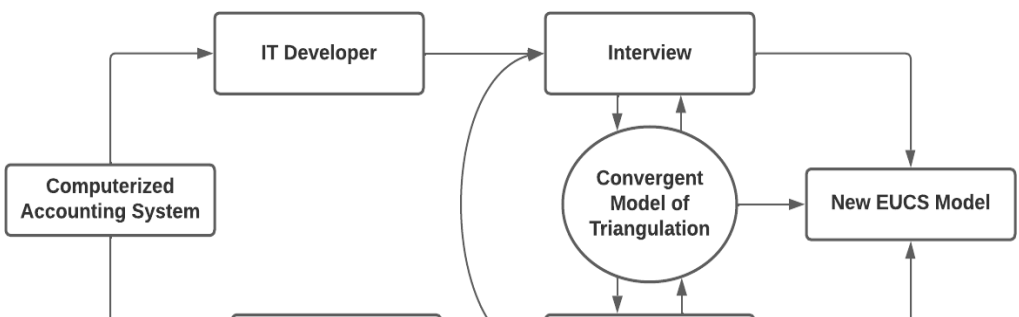
The user or customer expectation is a priority being looked at in a product or service, according to the study of Almsalam (2014). And this serves as the benchmark of the customer to the product or service offered. It is the aspiration of the customer to the serviceability of the commodity established from their needs (Yusof, 2017). This notion is also seen in "Technology Acceptance Model (TAM)" which includes "perceived ease of use" (PEOU) and "perceived usefulness" (PU)". These perceptions as to the system's ease of use and usefulness pertain to the expectations of the users which influence the practice and objective of the end-user concerning accepting the information system (Cakir and Solak, 2015; Vululleh, 2018). These perceptions or expectations serve as a benchmark if the users are satisfied, which will lead to the acceptance of the information system.

The expectation is vital since it could influence a user in deciding which product to buy (Ali *et al.*, 2015; Almsalam, 2014). The user or consumer will have a review of the product and the said reviews are based on their expectation which can result in the satisfaction or dissatisfaction of users. The feedback of the end-user will be based on the expectation of the IS. Therefore, satisfaction can be filled or unfilled (Qazi *et al.*, 2017) by the emotional reaction to the product that was received by the users. This was explained in the Expectancy Disconfirmation Theory which was developed to understand customer decision-making (Oliver, 1980). Expectancy Disconfirmation Theory accentuates the link between satisfaction and user expectations (Bhattacharjee, 2001; Bhattacharjee & Premkumar, 2004; Kettinger & Lee, 1994). This theory elaborates that when the perceived performance is greater than the expectation, there will be high satisfaction. Hence, the expectation of the end-user has an impact on their level of satisfaction.

As technology evolves and makes the data susceptible to various threats that may impede the credibility and accuracy of the information, it has become imperative to develop an extensive system of security (Viner, 2018). Peikari (2010) elucidates that system security affects customer retention and satisfaction. As a result, incorporating *system security* into the EUCS model has been considered. In addition, the comparison of the *user expectation* and the received experience should also be incorporated into the model, as satisfaction is defined as the discrepancy between expectation and the actual received (Aigbavboa & Thwala, 2013). With these definitions and reasons, these factors are included in the proposed EUCS model.

I. Conceptual Framework

Figure 1
Conceptual Framework



As seen in Figure 1, persons related to CAS, which are IT developers and end-users participated in the study through interviews and responding to the survey questionnaire. Results acquired from these interviews and surveys were synthesized using the Convergent Model of Triangulation. Formulation of the proposed new EUCS model was then conducted. To validate the formulated model, Confirmatory Factor Analysis was utilized to validate the factors included in the new EUCS model.

II. Methodology

Research Design

To answer the research problem, descriptive research was used. The research uncovered details on the factors affecting end-user satisfaction affected by current phenomena such as considerable advancement of technology and the rising security threats in the Philippines. The study used a convergent model of triangulation, which analyzed the end-users of CAS and IT developers as two distinct respondents. A subsequent design was used to determine the viability of the proposed new EUCS model.

Respondents

The respondents of this study were categorized into two classes. The qualitative method involved IT developers, while the quantitative method included accountants who utilized CAS as an in-house accountant or an accountant who renders compilation or bookkeeping services.

The data coming from the IT developers were consolidated with the quantitative data to further validate and support the variables included in the proposed model. The consolidated result

initiated the formulation and conceptualization of the proposed EUCS model of the study.

The respondents in the survey included accountants working in an accredited accounting firm or partnership within the NCR found in the listing issued by the PRC as of February 2021. Accredited accounting firms or partnerships are business establishments that are officially authorized to operate in the country. An accredited firm has a certificate of accreditation which is issued after completing a series of steps and submitting required documents to PRC.

Sample Size

Since the study used Confirmatory Factor Analysis (CFA) for the quantitative method, it was necessary to have a minimum of 290 respondents. The snowball sampling utilized helped in achieving this as one email sent inside the company was passed to other employees until most, if not all, who were qualified, were able to answer the survey. The justification for at least 290 respondents was based on Schumacker (2010), who stated that the researcher requires a much larger sample size in confirmatory factor analysis to maintain and obtain stable parameters. The rule of thumb is 10 subjects per variable, and the study has 29 variables in the survey questionnaire, hence the 290 respondents.

Although there is a need for a larger sample size to prevent the proposed model from being erroneous, the adequate sample size for CFA varies under different conditions (parameter estimation method, item number, and factor number). There may not be an acceptable number regarding the sample size (MacCallum, Widaman, Preacher, & Hong, 2001; Wolf, Harrington, Clark, & Miller, 2013), but a sample size of 300 or more is expected in general (Worthington & Whittaker, 2006). In this way, the fitness of the model can justify the new proposed EUCS

model. Considering the limitations and delimitations imposed in the study, a total of 313 respondents would be sufficient to validate the proposed model. The 313 responses were from the 322 total population of the 56 accredited firms/partnerships who agreed to participate in the study. An excess number of responses over the minimum requirement was an allowance for the statistical application to run smoothly.

Research Instrument

Several instruments were used to achieve the study's objectives that employed both quantitative and qualitative methods. For the qualitative analysis, an open-ended, structured interview guide was used that involved questions regarding the different variables considered in the development of the CAS. The interview was used to validate whether the variables included in the proposed EUCS model can directly or indirectly influence end-user computing satisfaction. Google Meet and Google Forms were used to administer the interview. The interview questions were based on the initial EUCS theory proposed by Doll and Torkzadeh (1988), Chin and Lee (2000) and Ilias and Razak (2011), and other theories such as Security Triad, EDM, and TAM.

The quantitative data gathering was conducted using a 5-point Likert scale, which ranges from strongly agree to strongly disagree. The survey was administered through Google forms which is composed of three parts. The first section contained the informed consent form and data privacy agreement to ensure that participation was voluntary. The second section included the demographic profile and the determination of qualified respondents. The last part contained the 5-point Likert scale questionnaire. The survey was adapted from the recent modification made in the EUCS model by Ilias and Razak (2011), and the additional items for the proposed variables were adapted from the Security Triad and Expectation Disconfirmation Theory.

Data Gathering

The acceptance of the firms to be part of the research was mostly received through phone calls. Once the acceptance was made, a letter of invitation was sent to the designated email address. The recipient of the email was then asked to forward the survey link to another end-user of CAS inside their firm. The follow-up was done every other day to ensure that the survey was continuously moving. Of the 56 firms, 322 are end-users of the CAS. A total of 322 surveys were administered, but only 313 responded to the questionnaire.

The data gathering was conducted from August 2021 to November 2021. Communicating with various firms commenced during the first week of August 2021 up until the first week of October. Communication through phone calls lasted for an average of three to five minutes per firm. The last day of accepting responses was the first week of November 2021.

For the interview, Filipino IT developers who are engaged in developing, maintaining, and updating the CAS used by the accounting firms were invited to participate. They were contacted through websites, phone calls, and Facebook pages. Once the IT developers accepted the invitation, they were asked whether they were available for a computerized-assisted interview. If not, the Google form that contains the open-ended interview questions was administered.

Ethical Cosideration

Since the undertaking of this research required data from people who are engaged in an information system of an organization, the researchers guaranteed strict confidentiality and that all data gathered from them was for the sole purpose of the study.

The researchers sent a letter of invitation to seek the participants' consent to gather data from them and use the said data for the study. Participation in the study was voluntary and respondents were allowed to withdraw from the study by

informing the researchers verbally or ceasing participation. The respondents were also not required to disclose any confidential information that might compromise their professional ethics. The non-disclosure of the identities of the participating firms was also prioritized in order to maintain and protect their privacy. The proponents of this study maintained strict adherence to the data privacy act.

Statistical Treatment

The following statistical tools were used in interpreting the results of the gathered data from the respondents: CFA, chi-square test, Comparative Fit Index (CFI), Tucker-Lewis index (TLI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Cronbach alpha, and Average Variance Extracted (AVE). These served as the basis for interpreting, analyzing, and coming up with the conclusions of this study.

To process these statistical tools, the study used RStudio, a code-based program that is used for statistical programming. SPSS, on the other hand, was used to generate the graphical presentation in this study.

Results and Discussion

A. Quantitative Data

A total of 322 accountants from different companies and industries participated in the online survey. Out of the 318 respondents, only 313 were found to be eligible for the study. This chapter is divided into three sections. The first part presented the basic demographic characteristics of the survey participants. The second section dealt with results of the CFA of the new EUCS survey. The last section presented the construct validation of the new EUCS survey.

Demographic Profile

Table 1

Summary of the Demographic Characteristics of the Selected Accountants

Variable	Frequency	Percentage
Age		
20 to 30 years old	180	57.5%
31 to 40 years old	106	33.9%
41 to 50 years old	17	5.4%
More than 50 years old	10	3.2%
Gender		
Female	173	55.3%
Male	134	42.8%
Prefer not to say	6	1.9%
Years of experience using CAS		
Below 1 Year of Experience	40	12.8%
1 to 4 Years of Experience	191	61.0%
More than 5 Years of Experience	82	26.2%

Table 1 shows that more than half of the respondents (57.5%) are young adults between the ages of 20 and 30. The majority of respondents (55.3%) are female, with a small proportion (1.9%) preferring not to disclose their gender. In terms of CAS experience, approximately three out of every five respondents have 1 to four years of experience. Approximately one in every four respondents has more than five years of experience with CAS, while approximately one in every ten respondents has less than one year of experience using CAS.

Proposed New End-User Computing Satisfaction Questionnaire

Table 2

Measures of Fit for the Initial Proposed New End-User Computing Satisfaction

Fit Index	Recommended Value	Actual Model Value	Model Fit
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χ^2/df (User vs. saturated model)	< 2. 0	1.011	Excellent fit
CFI	> 0.95	1.0	Excellent fit
TLI	> 0.95	1.0	Excellent fit
RMSEA	< 0.08	0.006	Excellent fit
SRMR	< 0.05	0.046	Good fit

Based on Table 2, all measures of fit indicate that the model has an excellent fit on the given data. This means that the proposed model for the new end-user computing satisfaction closely resembles the sample data.

Table 3
Estimated Factor Loadings for the Initial Proposed New End-User Computing Satisfaction

Variable	Effect	Standardized Effect	Z statistic	p-value
Content				
Item 1	1	0.89	NA	NA
Item 2	0.964	0.858	23.693	< 0.0001*
Item 3	0.983	0.876	28.349	< 0.0001*
Accuracy				
Item 1	1	0.644	NA	NA
Item 2	1.284	0.827	14.851	< 0.0001*
Item 3	1.367	0.881	14.429	< 0.0001*
Ease of use				
Item 1	1	0.89	NA	NA
Item 2	0.956	0.851	21.619	< 0.0001*
Item 3	1.047	0.932	22.793	< 0.0001*
Timeliness				
Item 1	1	0.817	NA	NA
Item 2	1.092	0.893	28.08	< 0.0001*
Item 3	1.078	0.881	25.922	< 0.0001*
Speed				
Item 1	1	0.891	NA	NA
Item 2	0.993	0.885	33.508	< 0.0001*
Item 3	1.032	0.919	34.368	< 0.0001*
Format				
Item 1	1	0.924	NA	NA
Item 2	0.941	0.87	24.756	< 0.0001*
Item 3	0.953	0.881	27.71	< 0.0001*

Reliability				
Item 1	1	0.938	NA	NA
Item 2	0.755	0.708	20.595	< 0.0001*
Item 3	0.968	0.908	24.952	< 0.0001*
User's expectation				
Item 1	1	0.859	NA	NA
Item 2	0.989	0.849	27.079	< 0.0001*
Item 3	0.884	0.759	25.921	< 0.0001*
Item 4	1.026	0.881	31.012	< 0.0001*
System's security				
Item 1	1	0.895	NA	NA
Item 2	0.93	0.833	20.641	< 0.0001*
Item 3	0.916	0.82	21.228	< 0.0001*
Item 4	0.806	0.721	17.363	< 0.0001*

**Denotes significance at a 5% alpha*

The table above displays the estimated factor loadings upon conducting a confirmatory factor analysis for the 9-factor end-user computing satisfaction survey. Note that each factor has a factor loading of 1.0 on its first indicator variable. Based on the table, all estimates are statistically significant at a 5% significance level. One indication that a measurement model is good is when the standardized factor loadings under the same latent factor are close to each other. For instance, the factor loadings for the items with the *content* range from 0.858 to 0.89, which is not too far from each other. The closer the estimated factor loading is to 1.0, the stronger the influence of the latent factor on the indicator variable.

On the other hand, the first item for accuracy, the second item for reliability, the third item for user expectations, and the fourth item for system security have factor loadings that are relatively lower compared to the rest of the items in their set. This can be a sign that the model is weakly identified. To see if the questionnaire could be improved further, the researchers tried to remove the items with low factor loadings and re-estimated the model. The results of the CFA for the modified questionnaire are presented in the following tables.

Table 4

Measures of Fit for the Modified Proposed New End-User Computing Satisfaction

Fit Index	Recommended Value	Actual Model Value	Model Fit
χ^2/df (User vs. saturated model)	< 2.0	0.883	Excellent fit
CFI	> 0.95	1.0	Excellent fit
TLI	> 0.95	1.0	Excellent fit
RMSEA	< 0.08	< 0.001	Excellent fit
SRMR	< 0.05	0.041	Good fit

Table 4 shows that all measures of fit have improved over the previous model. This means that the proposed model for the new end-user computing satisfaction closely resembles the sample data.

The factor loadings for each construct increase significantly after the removal of the items mentioned above, making the model more reliable. Moreover, the factor loadings for each latent variable are more stable compared to the previous model, indicating a better fit to the data. The results of the CFA show that the indicators on the questionnaire can adequately measure the different aspects of end-user computing satisfaction. To strengthen the support for the construct validity of the model, reliability coefficients and average variance extracted from the factors were computed and presented in the next section.

Construct Validation of the New EUCS Questionnaire

The following table presents the different validation measures for the proposed new end-user computing satisfaction survey. Reliability was measured using Cronbach's alpha coefficient, which gauges the degree of internal consistency of the set of items in measuring a certain latent factor. The average variance extracted (AVE) measures the amount of systematic variation in the data that is captured by the factor model over the total variation that includes the variation due to measurement errors. A higher value of AVE supports the convergent validity of the model.

Table 5

Measures of Reliability and Convergent Validity of the Proposed New End-User Computing Satisfaction

Latent Factor	Initial Model		Modified Model	
	Reliability	AVE	Reliability	AVE
Content of the system	0.906	0.765	0.906	0.765
Accuracy	0.825	0.625	0.841	0.727
Ease of use	0.919	0.795	0.919	0.795
Timeliness	0.895	0.747	0.895	0.747
Speed	0.926	0.807	0.926	0.807
Format	0.906	0.796	0.906	0.796
Reliability	0.892	0.735	0.888	0.800
User's Expectation	0.904	0.703	0.888	0.728
System's security	0.869	0.672	0.874	0.744

Based on the table, all the estimated reliability coefficients for all the latent factors are above 0.80, suggesting that the items within each factor have strong internal consistency. Moreover, all estimates for AVE are greater than 0.5, which suggests that more than half of the variation in the responses of the participants can be attributed to the latent factor being measured. These results present strong evidence for the construct validity of the model. Therefore, the new EUCS survey can effectively measure the satisfaction of the users towards CAS.

It is noteworthy to look at the factors in the modified model where the items with low factor loadings from the first model were removed. The AVE for *accuracy* has improved by about 0.102 units. For reliability, it improved by about 0.065 units. Then, for *users' expectations* and *system security*, the AVE has improved by 0.025 and 0.072 units, respectively. This indicates that the validity of the model improved after removing the aforementioned items. Although it is not recommended to remove items from the original model, this exercise can give the researchers an idea to improve those items by either fixing the wording of the items or

replacing them with a more appropriate statement that is more consistent with the rest of the items in the group.

Table 5 indicates how valid the different factors are to the EUCS model. Based on the result, all elements included in the proposed new EUCS model are valid; thus, the factors can validly measure the end-user computing satisfaction. In line with this, speed yielded the highest Average Variable Extraction (AVE). Rushinek and Rushinek (1985) hypothesized that speed is the most significant factor that affects end-users' satisfaction. Speed concerns how fast the information is being processed—the CAS' ability to quickly provide the information needed can influence the computing satisfaction of the users (Azwar *et al.*, 2020). This is supported by the results of the qualitative method that shows that the interviewees believe that speed is essential in the system since time is significant in business. They even added that the speed of the system also affects the willingness of the user to adapt to the computerized accounting system since it affects their productivity at the individual and corporate levels.

Conversely, Accuracy yields the lowest AVE among the nine factors. Although Accuracy has the lowest AVE, it is still a valid factor since it is above the threshold of 0.5. Hence, Accuracy can measure the EUCS. According to Alsufy (2019), the accuracy of accounting information systems is one of the bases of financial data because it gathers information presented in financial statements. An error-free system is impossible to develop, but errors can only be minimized (Rana *et al.*, 2017) to ensure that the CAS can provide accurate information. With this, accuracy can affect the satisfaction of the users (Munap *et al.*, 2018). This notion is strengthened by the participants of the study who also argued that it is impossible to create an error-free system. However, accuracy would be beneficial for the end-users by making their tasks more efficient.

B. Qualitative Data

This section presents the perspective of the IT developers regarding the role of the proposed new factors in the computing satisfaction of the end-users. The IT developers who participated in the interview are those with extensive knowledge in developing CAS. They are involved in the formulation, enhancement, and/or maintenance of the CAS. In this way, the researchers derived ideas regarding other factors that they consider in devising accounting systems while meeting the satisfaction of the users.

System Security

The results of the qualitative method show that the interviewees believe that security affects end-user computing satisfaction. The growing concern for cyber security threats emerges as the business industry shifts from traditional processes to automation. Therefore, the emphasis on security measures has become significant in every industry. Stored information is one of the primary concerns in the computerized accounting system (CAS). Safekeeping of this data is the role of system security. According to the developers, *“part of our goal is to make a system that has a high integrity level wherein users would feel that they are safe using our systems.”* Furthermore, they believed that system security shall play an emphasis in the development of CAS because *“we are talking about the data of the entity”*. And *“there are parts of the software and/or system that should be secured. This is a process, a business process. Important data is being processed by the system”*. This strengthens the importance of security in the CAS.

However, system security alone cannot keep the end-user satisfied. The developers elaborated that *“users do not even read the security protocol, actually. So mostly the key thing is you have to be aware, like awareness on the security so that people may always be secured using platforms like this online”*. As stated, the end-user must also be aware of the security parameters established in the CAS. End-user awareness is also essential in recognizing cyber security threats and responding to them accordingly. Thus, the satisfaction of the end-user is through their awareness of security protocols and the embedded security system of the CAS. Moreover, satisfaction happens when the user

feels safe and secure when using the CAS (Kassim *et al.*, 2012). However, satisfaction can be influenced by awareness (Pham *et al.*, 2010). Thus, the satisfaction of the end-user is through their awareness of security protocols and the embedded security system of the CAS. It is noted that security influence the integrity, confidentiality, and availability of the data.

User Expectation

Expectation, which is how a user views a product even before indulging in it, serves as the user's benchmark in gauging the usefulness of a system in meeting their needs. In this regard, the participants agree that a user expectation is very much needed whenever they engage in the development of a system. For this reason, they apply and consider these expectations in software development. The developers believe that the functionalities of the system and its impact on the task of the users are part of the expectations of the client. Furthermore, security of the information is also one of the key components that are usually included in the client's expectation. However, one of the participants argued that not all expectations are considered during the development stage.

With regards to ensuring the known expectations, feedback of the user about meeting their expectations or not has been agreed upon by all the participants as a tool for them to enhance and maintain the effectiveness of the system. Participants added that *"the reason why we are utilizing the feedback is because we are building the platform for our users. If we are not utilizing the feedback, we're building the platform for ourselves, not for our users."*

Meeting the expectations of the users is of the essence as the developers believe that it leads to user satisfaction. Satisfied users *"will let the users have the confidence in using your system and will gain trust from your developments."* Moreover, *"project success [meeting expectations] leads to more satisfied users which*

will equal to a longer running system". In addition, for them, user satisfaction is an understatement. According to them, fulfilled expectations lead to a better term called, "user delight". When asked what will happen if the expectations are met, Participant 1's direct answer was, "well, there will be a user delight. User delight is above everything else. It's like a wow factor. They're not just satisfied. They're being just... just say the wow word. Like they just, 'wow, amazing'." Therefore, user expectation has a role in satisfying the end-users that eventually leads to a system's success. Because of the huge part that it plays in system development, developers have to devise ways of knowing what are these expectations and make sure that they are met. *User Involvement* during the development process is also imperative in making sure that the developers are on the right path in giving what the users want in their system. Lastly, meeting user expectations leads to a higher form of satisfaction, which is the user's delight.

Figure 2.

Modified EUCS model

Graphical Presentation

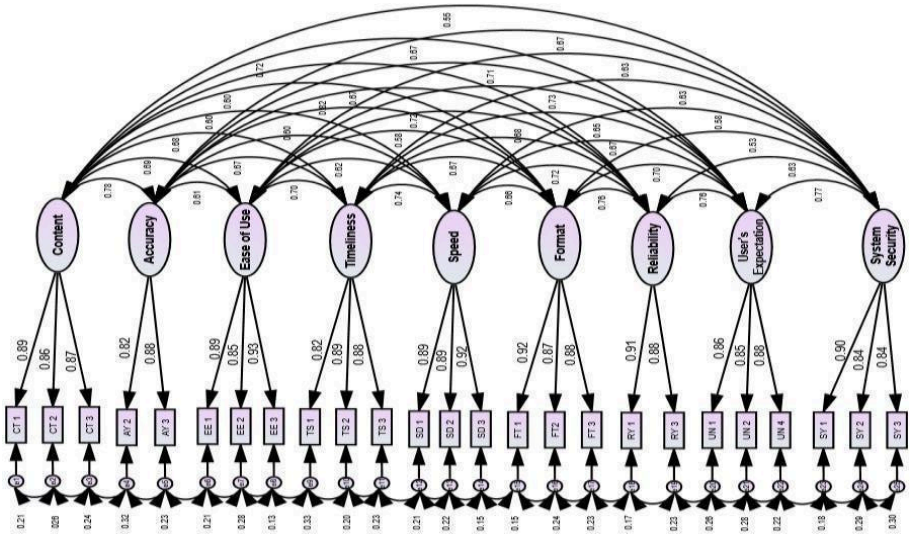


Figure 2 is the Modified Proposed EUCS Model along with the data discussed in the previous sections. The nine factors are inside the oval shape, and the single line arrow presents the standard estimated factor loadings for every variable item in each factor. Moreover, the double-headed arrows indicated co-variance, showing the relationship between the factors in measuring the latent variables. The results of the CFA show that the indicators on the questionnaire can adequately measure the different aspects of end-user computing satisfaction. The figure indicated that the reliability coefficients suggest that the items within each factor have strong internal consistency. Furthermore, the expected average variance shows that the latent factor being measured accounts for more than half of the variation in the responses of the participants. These findings provide strong support for the construct validity of the model. As a result, the

new EUCS survey can effectively measure user satisfaction with CAS.

Conclusion

The study proposed a new end-user computing satisfaction model that includes system security and user expectations as additional factors. To know if the proposed new EUCS Model is valid, assumptions on the model's fitness, reliability, and precision were tested. The results show that the model has an excellent model fit, meaning that the proposed model closely resembles the sample data. The analysis of the data also shows that the proposed EUCS model showed an excellent level of reliability. A high level of reliability coefficient entails that there is a high degree of internal consistency among the items on all nine factors in the proposed new EUCS model. This result proves that the items per factor can assess the latent variable while yielding the same scores because they are correlated with each other.

On the other hand, the precision of measuring the constructs, which is seen in the results for the Average Variance Extracted (AVE) estimate of the model, shows that all the factors display an excellent value. This excellent value signifies that the proposed new model can effectively measure end-user computing satisfaction using the nine constructs. These quantitative inferences are supported by the perception of the IT developers, who claimed that all the proposed factors in the new EUCS model are factors that they consider whenever they develop a system because they could directly and/or indirectly influence the computing satisfaction of the end-user, thereby resulting in the success of the information system. From the information presented, it can be concluded that the study has shown strong evidence that the new proposed EUCS model is valid and can be used in evaluating the effectiveness and efficiency of the CAS.

Recommendations

1. **Management of the Company:** Companies that utilize information systems in their transactions may opt to use the

new EUCS model survey to assess the satisfaction of the users of Information Systems in their organization. This will help them to know if their system is sufficient for the users or what aspect of their system needs improvement.

2. **IT Developer:** Developers may consider the nine constructs of the new model in conceptualizing the software that they develop. They may also use the new EUCS model to know if their clients, the end-users of the system, are satisfied with their development. Also, it is evident that the Accuracy factor rendered the lowest result in the study. Hence, the developers should focus on minimizing the errors in the system.
3. **End-Users:** The end-users were encouraged to participate in any survey that their company may administer about their CAS usage. This may help them to communicate their issues about their system. Likewise, the end-users may suggest to their management to administer this kind of survey, if ever there is currently none.
4. **Future Researchers:** Future researchers may expand this study and consider different industries aside from accounting firms/partnerships. A different set of respondents might yield different results. Future researchers may also consider a more extensive population since the statistical treatment demands a larger sample size. They might also consider another type of information system that is used by different sectors.

The COVID-19 pandemic prevented the researchers from gathering more information to further the study. The surge of the pandemic forced the business firms to operate on a work-from-home setup that impedes the researchers from immediately receiving the responses of the participants within the time frame. Delayed receipt forced the researchers to exclude

some firms from the roster of respondents. This limitation might be avoided if the study was conducted under normal circumstances.

Another restriction that the researchers faced was the time constraint. The data-gathering phase coincided also with the busy season for accounting firms, which had deadlines to accomplish. The researchers were unable to wait for responses of other participating firms who failed to make the deadline hence additional data were not obtained. The conduct of the study was also affected by the insufficiency of accounting firms' internet presence in terms of the available contact information, and the ability of the firm's personnel to respond to phone calls. The researchers were therefore limited only to those firms/partnerships that have active contact details.

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