SAP Implementation, User's Satisfaction, and Its Utilization

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Abstract—**This study explores the extent to which System Application and Product (SAP) implementation can satisfy users completing their work regarding user perceptions. Moreover, the extent to which the theory of planned behavior (TPB) moderates satisfaction provides positive user influence on SAP utilization continuously. The data for this study were obtained from surveys by distributing questionnaires to SAP users and conducting interviews with several people who were directly involved either in doing implementation or using SAP. Based on a survey of 67 respondents, results support the two dimensions of information system (IS) success—system quality and perceived usefulness—have a significant effect on user satisfaction. The high quality of SAP further enhances user satisfaction about SAP itself, and when SAP provides benefits to users, it will further please them. However, the evidence does not seem to suggest that information quality affects user satisfaction. This fact may be evidenced in that SAP releases information in the form of financial statements, and if they needed to be processed again, users would be less satisfied. TPB explains that the effect of user satisfaction increases the intention to use the system continuously. This study finds significant user satisfaction from their utilization with and without TPB moderating.**

Keywords—SAP implementation; user satisfaction; user perceptions; SAP utilization.

I. INTRODUCTION

When someone refers to companies such as FoxMeyer Drug, Mobile Europe and Dell Computer, he recalls firms that faced financial, organizational and technical problems in the implementation of their enterprise resource planning (ERP) systems. Davenport in Kanellou & Spathis [1] states that some of these problems may have occurred due to the enormous technical challenges of implementing enterprise systems, but even though these challenges may be significant, they are not the main reason for ERP implementation failure. The most significant problems are business issues and that companies often fail to combine their business needs with the technological imperatives of their systems [1]. Research from Saatcioglu in Kanellou and Spathis [1] tried to identify the effects of benefits, barriers and risks on user satisfaction in ERP projects and suggested that although ERPs provide a lot of benefits, there are barriers that businesses need to overcome during ERP implementations and that if these barriers are not overcome they can become rick drivers. Besides the problems mentioned above, Standaert, Muyle, & Basu [2] state that organizational investment toward the development of information technology is very expensive. So, it is essential for the company to ensure that the implementation of ERP can yield benefits that are proportional to the value of its investment. ERP is a corporate system that encompasses all the functions within the company that is driven by several integrated software modules to support the company's internal business processes [3].

Measuring the success of an information system (IS) is a lengthy evaluation process, consisting of various dimensions and steps. One of the standard models used to measure the success of an IS is the success model of ISs developed by both DeLone & McLean and [4] and developed by Seddon & Kiew [5]. The successful models of these scholars are simple and often used by researchers studying ISs, especially looking at how successful the IS is that they have studied5. As with any information system (IS), user perceptions about an ERP system play an essential role in its usage and future success4. The premise is that positive user perceptions could lead to higher acceptance and better usage of the ERP system6. Negative user perceptions or unmet expectations could lead to resistance and increased workarounds, both of which will augment company costs. Regardless of how expensive and up-to-date a firm's ERP system is, if end-users avoid it and accept it grudgingly, then the expected benefits of the ERP will not materialize [6].

There is still nevertheless, rarely does research examine the specific details of the ERP product itself—in this case, SAP. SAP is an ERP software product that can integrate a wide range of business applications, where each application

represents a specific business area. The use of SAP can reduce the amount of cost and time spent developing and testing existing programs within a company. This study aims to measure the extent to which the success of ISs SAP through the perception of users, especially in the accounting and finance fields, by modifying the success model of ISs from [5]. The selection of this model used two variables: user satisfaction and system utilization, the latter serving as the dependent variable.

This study is interesting Few studies specifically link SAP implementation with accounting ISs. Besides, there are still droves of companies both implementing and increasing SAP levels in their business processes, so research regarding SAP implementation has room to grow. The contribution of this study is to develop research related to accounting information system that is based on ERP, namely SAP, wherein previous research has not been limited to a certain type of use, leaving the results unable to distinguish the system quality for accounting information. In addition, this study looks at attitudes, behaviors, subjective norms, and behavioral control, which are elements of the theory of planned behavior (TPB), as a variable that moderates the user's intentions in utilizing SAP to complete his work. The TPB is a dispositional approach to cognitive self-regulation and provides a conceptual and methodological advance in the prediction of behavior and the attitudes behavior consistently [7]. According to TPB, attitudes toward behaviors, subjective norms, and behavioral controls influence the intentions of individuals in displaying certain behaviors—in this case, user intentions in using SAP. Therefore, we use the elements present in the TPB to see how far they can moderate SAP user intentions to continue utilizing SAP as the IS used in completing their work. TPB is rarely used by studies previously researching the same area. TPB is an essential factor concerning user perceptions because if a study considers the influence ISs have on user perceptions most of the results will undoubtedly be positive. Moderated by TPB, it is hoped that the results of the study will illustrate and reinforce those positive influences.

II. LITERATURE REVIEW

A. Theory overview

The theories underlying this study are TPB and the theory of acceptance model (TAM). TPB predicts an individual's intention to engage in behavior at a specific time and place. It posits that individual behavior is driven by behavioral intentions, which are a function of three determinants: an individual's attitude toward a behavior, subjective norms, and perceived behavioral control. TPB was initially proposed by Ajzen in 1991, and TAM by Davis in 1986. TAM has proven to be a useful theoretical model in helping to explain and predict user behavior related to information technology [8]. TAM provides a basis with which one traces how external variables influence beliefs, attitudes, and intentions to use something. Two cognitive beliefs are posited by TAM: perceived usefulness and perceived ease of use. According to TAM, one's actual use of a technology system is influenced directly or indirectly by the user's behavioral intentions, attitudes, perceived usefulness of a system, and perceived ease of the system. TAM also proposes that external factors affected intentions and actual use through mediated effects on perceived usefulness and perceived ease of use.

1) The Effect of Information Quality to User Satisfaction

Sirsat & Sirsat [9] found the Delone and Mclean models useful and respondents felt that the quality of the system and the quality of information generated through the unified district IS for education (UDISE) was useful and easy to understand. However, the way they feel toward the system is built on the quality of service and what the system can support in meeting user requirements. The quality of the system and the quality of information independently and together affect both usage and satisfaction [4]. Users of ISs will be satisfied with the IS if the user believes that the quality of information generated from the IS used is good so that information can be understood and used. As a result, the hypothesis is tested is:

H1: The information quality of SAP has a positive effect on user satisfaction of that accounting IS.

2) The Effect of System Quality on User Satisfaction

Boroufar, Sadeghy & Shokohyar [10] found that system, information and service quality indirectly affected e-education success as determined by user satisfaction. Rai, Lang & Welker [11] examined the integration of the IS success model DeLone & McLean who found that there are three constructs—system, information quality, and net benefits—to measure the success of a system. ISs are considered qualified when their users always use them in carrying out their duties because the IS supports the effectiveness and efficiency of its work to provide satisfaction to users of ISs.

H2: The quality of the SAP system has a positive effect on user satisfaction on the accounting IS module.

3) The Effect of Perceived Usefulness to User Satisfaction

Calisir and Calisir [12] aimed to better understand what factors affect ERP end-user satisfaction. Zviran [13] examined the relations between user satisfaction and perceived usefulness in ERP. The impact of the use of ISs on individual performance compared with the level of user satisfaction has a reciprocal relationship [4]. Perceptions of benefits can be said to trust the users of an IS because it obtains benefits or usefulness that can help work performance. The usefulness of users of information systems can be seen in the confidence of IS users. If they feel that the system is useful, they will use it [14]. Thus, the more users feel the benefits from an IS, the more they will be satisfied in using it.

H3: The perception of SAP benefits has a positive effect on user satisfaction on the accounting IS.

4) The Effect of User Satisfaction on SAP Utilization

The use of the system is one of the variables that measure the success of a system [14]. Tan [15] found that the quality of the system has a significant effect on the intensity of its use and that intensity has a significant effect on individual performance. If the user is satisfied with the accounting information system then its use will likely be continuous, such use intensity and utilization of the accounting IS will be increased. Besides, this study uses attitude toward behavior, subjective norms, and behavioral controls, elements of TPB,

as variables that moderate user intentions to utilize SAP to complete their work. Therefore, we use the elements present in the TPB to see how far TPB can moderate SAP user intentions to continue utilizing SAP as an IS used in completing one's work. Moderated by TPB, it is hoped that the results of the study will illustrate and reinforce those positive influences.
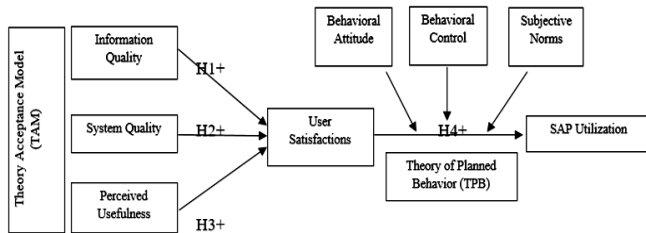

Fig. 1. Research Model

H4: User satisfaction from an accounting IS based on SAP has a positive effect on the utilization of SAP continuously, moderated by the theory of planned behavior.

The theories used in this research are described (Figure 1).

III. RESEARCH METHODOLOGY

A. Research Method

This study used primary data by distributing questionnaires to SAP users. Unit analysis of this study are all users of SAP, particularly those in the accounting and finance fields. The sample is obtained by a purposive sampling method, which is a sampling method based on specific criteria as follows:

- The respondent should be the user of SAP.

- The respondent should be in either an accounting or finance field.

- The respondent must have used SAP for at least five years. This criterion was chosen because the user will have already known how to operate SAP and gain the benefits and conveniences it provides.

- The company has been running for at least five years in implementing SAP. This criterion was chosen because it indicates that SAP implementation can be considered successfully as implemented following company's business process.

The research instrument of this study was a survey employing a questionnaire. Data were collected by distributing questionnaires either directly or via e-mail to the respondents and having a specified period for completion of no longer than two weeks. All questions in the questionnaire were adapted from Pavlou & Fygenson [16]. Questionnaires sent via e-mail took the form of a Google document questionnaire. After the respondent filled out the questionnaires, it was automatically entered into Microsoft Excel both entirely and per item. Plus, the data obtained directly from the respondents who manually filled out the questionnaire were then manually entered into Microsoft Excel.

The research variable is a concept that has a disparity in value. In this study there are variables that are classified as follows:

- The dependent variable is user satisfaction and utilization.

- The independent variables are information quality, system quality, and perceived usefulness.

- The moderating variables are attitude, subjective norms, and behavioral control.

Measurement of these variables will be determined based on the questionnaire's items and supported by a Likert scale, where one means strongly disagree and four means strongly agree.

B. Data Analysis

This study used a quantitative method for its data analysis. Hypothesis testing in this study used the SmartPLS 3.0 computer program. With the target number of research samples (N) of 100 respondents, with a one-tailed test and a 95% confidence level (or significance), so that the r table value could be known. From the correlation table of product moment, it is known that the r value is 0.170 (N = 100, df = 100, 5% significance).

In this study used two data processing statistical methods: descriptive analysis and analytical analysis. Analyses related to the explanation of various behavioral variables are done by descriptive analysis based on relevant theories and approaches. While analytical analysis showed interrelationships between various variables done by the statistical testing approach in the form of a simultaneous equation model (SEM) with SmartPLS software. SEM is a multivariate analytical approach used to simultaneously test and estimate complex causal relationships among variables, even when the relationships are hypothetical, or not directly observable [17]. Concurrently combining factor analysis and linear regression models, SEM allows the researcher to statistically examine the relationships between theory-based latent variables and their indicator variables by measuring directly observable indicator variables [18]. PLS regression is a recent technique that generalizes and combines features from principal component analysis and multiple regression. Its goal is to predict or analyze a set of dependent variables from a set of independent variables or predictors. This prediction is achieved by extracting from the predictors a set of orthogonal factors called latent variables which have the best predictive power [19].

IV. RESULTS

A. Descriptive Statistics

Table 1 shows the number of questionnaires distributed to the respondents of 100 (100%). Of the 100 questionnaires distributed, 73 (73%) were favored by the respondents and given to the researchers, while the remaining 27 (27%) were not. Of the 73 returned questionnaires, there were six questionnaires that were incomplete and did not fulfill the requirements (8.22%) so that the questionnaires that fulfilled the study' requirements were 67 (91.78%).

The majority of the SAP user respondents were women, 36 respondents or 53.73%. Most SAP users were above 37 years old, 26 respondents or 38.81%. Almost all SAP users had been employed for five years, 26 respondents or 38.81%. And experience using SAP was mostly five and six years, 31 respondents or 46.27%.

TABLE I.   DATA COLLECTION RESULTS

Description	Quantity	%
Questionnaire distributed	100	100%
Questionnaire not responded	27	27%
Questionnaire responded	73	73%
An inncomplete and ineligible questionnaire	6	8.22%
Qualified questionnaires	**67**	**91.78%**

TABLE II.   RESULTS FOR OUTER LOADINGS

ITEM	IQ	PU	SQ	US	UTZ	Result
IQ1	0.854					valid
IQ2	0.848					valid
IQ3	0.733					valid
IQ5	0.779					valid
IQ6	0.864					valid
PU1		0.908				valid
PU2		0.848				valid
PU3		0.793				valid
PU4		0.829				valid
PU5		0.913				valid
PU6		0.911				valid
SQ1			0.805			valid
SQ2			0.758			valid
SQ3			0.827			valid
SQ4			0.812			valid
US1				0.792		valid
US2				0.887		valid
US3				0.821		valid
US4				0.871		valid
US5				0.804		valid
UTZ1					1.000	valid

A. Measurement Model Results

1) Validity and Reliability Tests

The validity test used in this study was convergent validity, applied to a measurement model wherein the reflective indicator is measured by the correlation between item score and construct score, as calculated by PLS. The individual reflective size is high if it correlates to more than 0.70 (with a significance level of 0.05 and t-statistic > 1.96). Test results show that there is one invalid indicator, IQ4 because its value is 0.610, so the researchers removed it from the study. The other indicators were valid (Table 2).

The construct reliability in this study will be measured using composite reliability and Cronbach's Alpha. A construct has good reliability if both of these indicators are above 0.70. Here's the calculation of constructs using PLS (Table 3).

The output of the Cronbach's Alpha composite reliability test for each construct is very reliable because it is above 0.70. The value also shows the level of consistency and stability of the instrument used is very high. In other words, it can be concluded that the reliability of the instrument is good.

2) Empirical results

The empirical results of this study can be seen in Table 4.4 which evaluates the inner model to evaluate the influence of latent constructs or variables that have been hypothesized in this study. This result shows that the implementation of SAP from the user's perception, the information quality pertinent to user satisfaction, perceived usefulness in user satisfaction, system quality favoring user satisfaction, and user satisfaction in utilization. Here is the inner model calculation of the data obtained by using PLS.

The structural figure of partial least squares above can be interpreted by looking at the original coefficient of the sample on the resulting path coefficients table showing the relationship between the hypothesized variables. From that value, statistical testing can be performed by comparing the t value (t statistic from results path coefficients) with the t value of table where the level of significance used in this calculation is 0.05 (t statistic > t table value of 1.96). If the original sample coefficient shows the same direction of the relationship between the hypothesized variables and t statistics > t table value of 1.96, then one may conclude that the research is supported by the existing data.

TABLE III.   CONSTRUCT RELIABILITY AND VALIDITY

Item	Cronbach's Alpha	Composite Reliability
IQ	0.875	0.909
PU	0.934	0.948
SQ	0.816	0.877
US	0.892	0.920
UTZ	1.000	1.000

TABLE IV. MEAN, STDEV, *T* VALUES, *P* VALUES

Item	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	*t* Statistics (|O/STDEV|)	*p*-Values
IQ -> US	0.270	0.278	0.198	1.360	0.088
PU -> US	0.412	0.405	0.182	2.259	0.013
SQ -> US	0.254	0.255	0.126	2.011	0.024
US -> UTZ	0.503	0.503	0.096	5.266	0.000

TABLE V. MODERATING VARIABLE RESULTS

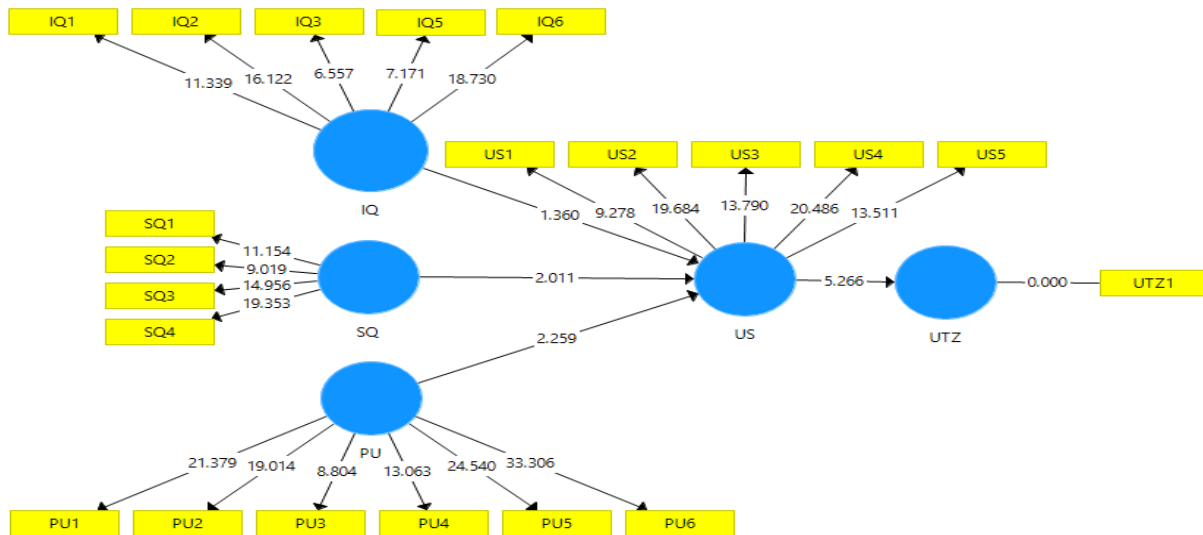| Item	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	*t* Statistic (|O/STDEV|)	*p*-Value
TPB -> UTZ					
US -> TPB					
US -> UTZ	0.385	0.404	0.100	3.870	0.000

Fig. 2.   Structural Figures of Partial Least Squares

From the results above, the information quality can be seen to have a positive influence on user satisfaction, as do perceived usefulness, system quality, and user satisfaction. Furthermore, there is a positive effect on user satisfaction found for utilizing moderating variables from TPB, as noted in Table 5.

3) Qualitative Results

System and information quality affect on user utilization and satisfaction [4]. Many challenges and difficulties arise from the implementation of an IS, leading to user dissatisfaction. Interviewees concurred that the implementation of SAP entailed many problems. One finance supervisor stated:

"SAP may be more suitable to manufacturing companies than others. There are some reports that SAP cannot generate. Thus, an additional program is required to obtain those reports. There is a difficulty tracing a transaction or data point because it requires a long process to enter into the transaction or data, especially for users who are not experts" (Finance Supervisor, 2017).

Utilization of the system is one of the variables used to measure the success of a system [14]. There are many companies that want to implement ERP to make their duties efficient and effective. ERP provides a lot of benefits, but there are barriers that businesses need to overcome during ERP implementation, and if those barriers are not overcome they can become risk drivers (Saatcioglu 1). One comment

made during an interview also corroborated the barrier of implementation:

"Implementation failures are usually seen from two sides. From the consultant's side, they hold down costs (as the client requests), so that work done on a blueprint is handled by a senior consultant, but undertaking the project is done by a junior one. From the user's side, there is a request to change the blueprint, with the same timeline. In short, they do not want to pay more, subject to the rigidities of their timeline due to cost considerations (SAP Consultant, 2017).

The SAP network is often under maintenance because the server is in a remote area, in Tayan, West Kalimantan, so that SAP cannot be accessed" (Senior Accounting Staff, 2017).

And then she said:

"be used directly by the accounting division, but cannot directly generate reports to management, it still has to be modified again because the form is not adequately readable for outside stakeholders.

"might explain why hypothesis 1 is rejected. The user is not satisfied with SAP's quality of information output. Many cases of SAP implementation suggest that several systems should be more advanced to be attainable in the future. The interviewees were requested to state their opinion regarding the best changes to be made to SAP. They presented their views:

"There is a lot of SAP content that cannot meet the needs of the company, so once again an effect is set between SAP and users (Respondent A, 2017).

Improve analytical capability in providing data (Respondent B, 2017).

But to satisfy users regarding SAP implementation:

"one time let us say day plus two at the end of the month all data has entered into the finance division, so it can proceed to be reported. I will continue to utilize SAP because it facilitates my work and I do not need to input much data anymore (Finance Supervisor, 2017).

"SAP makes it easy for me to complete my office work.

And Staff D said:

SAP can integrate data from various divisions in the company, thus presenting data more quickly, accurately and according to the wishes of the user (Respondent C, 2017).

V. Discussion

A. Quality of SAP Information and User Satisfaction

Authors and Affiliate After testing the data, the results obtained are summarized in Table 4.4. The information quality has a t statistic of 1.360, so t statistics smaller than t table (t statistics < t table value is 1.96). Besides, the quality information has p-value of 0.088, so the p-value is higher than the level of significance (p-value > 0.05). This shows that information quality has no effect and is insignificant concerning user satisfaction. The positive coefficient (original sample) value of 0.270 indicates that information quality has a positive effect on user satisfaction. But because the value of the t statistic < t table value of 1.96 then the results indicate that the information quality does not affect on user satisfaction.

From the test results, this study cannot support Hypothesis 1. The results do not, therefore, support the results of previous studies: DeLone & McLean [20], Seddon & Kiew [5], Almutairi & Subramanian [21], and Livari [22]. This result shows that a higher quality of information generated by SAP does not necessarily increase user satisfaction, at least according to their perceptions. This insignificant effect may be caused because output from SAP cannot be used directly by management, it still has to be modified once again so that the form can be readable for outside stakeholders, as one senior accountant mentioned. Besides, because the data analyzed in this study is collected via survey, which contains the weakness of possibly not reflected the real situation. This outcome occurs because respondents might not be severe when filling out the questionnaire, leading to biased or misleading results. And there was a lack of samples obtained such that the results may not be significant.

B. Quality of SAP System and User Satisfactions

After testing the data, the obtained results are summarized in Table 4.4. The system quality variable has a t statistic of 2.011, which exceeds the t table value of 1.96. Besides, system quality has p-value of 0.024, which is smaller than the level of significance value (0.05). These results indicate that system quality has a significant effect on user satisfaction. The positive value of the coefficient (original sample) of 0.254 indicates that system quality has a positive effect on user satisfaction, too.

Therefore, this study supports Hypothesis 2. According to TAM, if the system is easy to use then, it determines an individual's intention to use a system, with that intention to use serving as a mediator of actual system usage. These results are consistent with the results obtained by DeLone & McLean [20], Seddon & Kiew [5], Almutairi & Subramanian [21], and Livari [22]. Thus, it can be concluded that based on user perceptions, the higher the quality of SAP, the more user satisfaction with SAP itself will increase. As the financial supervisor stated, the display of SAP features is friendly, the accuracy is good, and it is time-saving, so much so that she is a satisfied user.

C. Perceived Usefulness of SAP and User Satisfaction

After testing the data, the results were summarized in Table 4.4. Perceived usefulness has a t statistic of 2.259, which is higher than the t table value of 1.96. Besides, it has p-value of 0.013, which is less than the significance level threshold (0.05). These results indicate that perceived usefulness has a significant effect on user satisfaction. The positive coefficient (original sample) value of 0.412 indicates the same thing.

Therefore, this study is supported Hypothesis 3. According to TAM, perceived usefulness determines an individual's intention to its use as a system with the intention of use serving as a mediator of actual system use. Thus, one may conclude that SAP has benefits for users and will further increase their satisfaction. As the financial supervisor stated, she will continue to use SAP because it facilitates her work and she does not need to input so much data any longer.

1) User satisfaction from SAP and Utilization

As shown in Table 4.4, user satisfaction had a statistical t value of 5.266, so the t statistic was highher than the t table value of 1.96. Besides, user satisfaction had a p-value of 0.000, making it smaller than the level of significance (0.05). This shows that user satisfaction is significant concerning utilization. The positive coefficient of 0.503 indicates that user satisfaction has a positive effect on utilization.

This study also examined the effect of user satisfaction on utilization as moderated by TPB. The result shown in Table 4.5 concludes user satisfaction has a t statistic of 3.870, which is greater than the t table value of 1.96). Besides, user satisfaction had a p-value of 0.000, which is smaller than the level of significance (0.05). These results indicate that user satisfaction is significant regarding SAP utilization. The coefficient value (original sample) was positive, equal to 0.385, which indicates that user satisfaction has a positive effect on utilization with a moderated variable for TPB.

Hence, this study supports Hypothesis 4. TPB can strengthen the significant effect of user satisfaction on utilization. It provides a parsimonious framework for identifying the immediate antecedents of any behavior with many practical advantages regarding prediction and potential intervention. Besides, it allows for a detailed and in-depth analysis of the specific beliefs that influence intentions and behavior [7]. Consequently, TPB can explain the results related to the influence of user satisfaction with the intention to use SAP continuously.

VI. CONCLUSIONS

The development of accounting ISs related to ERP provide benefits for users and companies. Previous studies of accounting ISs related to ERP are still limited to the use of certain types, so the results of the study cannot be used to distinguish the quality of accounting ISs. However, this study examined ERP with a particular type of product, i.e., SAP. By doing so, it was able to investigate the success of SAP implementations.

Based on a survey of 67 (valid) respondents, the results support the idea that the two dimensions of IS success, system quality, and perceived usefulness, have significant effects on user satisfaction. The high quality of SAP further enhances user satisfaction with it, further augmented by SAP benefits for users. However, the evidence does not seem to suggest that information quality affect on user satisfaction. This may be evidenced by the fact that SAP releases information in the form of financial statements that must be processed again, leading to some level of dissatisfaction. TPB explained that the effect of user satisfaction increases the intention to use a system continuously. This study found such significant user satisfaction with their utilization, both with and without the moderating TPB.

As with most studies based on surveys, there are limitations to this study. The data analyzed and assessed may not reflect the real situation, perhaps because respondents may not have been severe when filling out their questionnaires, leading to biased or misleading results.

Given the limitations, the findings of this study should be not taken as absolute. There was a lack of samples obtained in this study that may result in insignificant outcomes. Despite this shortcoming, this study contributes to investigate the implementation of SAP with AIS and to explore the relationship between SAP implementation and user perception. Future research should use larger samples, so it will be more representative and will better describe the actual conditions. Future research is also needed to develop this model by adding other variables.

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