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Preface

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The Electrochemical Society
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The ECS is seeking candidates to serve as the
Founding Editor-in-Chief (EIC) of ECS Sensors Plus,
a journal in the process of being launched in 2021

The goal of ECS Sensors Plus, as a one-stop shop journal for sensors, is to advance the fundamental science and understanding of sensors and detection technologies for efficient monitoring and control of industrial processes and the environment, and improving quality of life and human health.

Nomination submission begins: May 18, 2021

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Preface

We are delighted to introduce the proceedings of the first edition of *International Conference on Computer Science and Enineering* (IC2SE) 2019 with theme "*Industrial Revolution 4.0 Opportunities & Challenges*". The technical program has brought researchers and practitioners around the world to a good forum for discussing, leveraging and developing all scientific and technological aspects that are relevant to digital society. This *IC2SE 2019* acquired 256 full paper with 154 are acceptable with many categories paper with most paper are from Computer Science/Engineering, Information Technology and Education and also authors from almost 13 Countries such as malaysia, New Zaeland, Bangladesh, United Kingdom, Bahrain, Zambia, Nigeria, Saudi Arabia, Uganda, Pakistan, Iraq, and Palestine. This confrence was well-managed for the cooperation of all the committees and co-host from many universities and organisation. We hope that the future *IC2SE* will be as successful and stimulating, as indicated with the contributions presented in this volume.

The Editors
Robbi Rahim
Robby Dharma
Billy Hendrik
Abulwafa Muhammad

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All papers published in this volume of *Journal of Physics: Conference Series* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

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Statistical software adoption behaviour among Indonesia's undergraduate students

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Abstract. Technology usage among students is a must since revolution industry 4.0. However, there is a limited study about technology adoption among student. This study's objective is to explore the influence of external factors on usefulness and ease of use the statiscal software. Besides, this paper also analyses the association between ease of use and usefulness on behavioural intention to use SPSS among accounting students. By extending technology acceptance perspective (TAM), this study develops eight hypotheses. Seventy-three accounting students were registered at subject of business research method in accounting department, Bung Hatta University, participated in this study. Structural equation model-path least square is used to analyse the primary data. The result shows that computer attitudes has a positive relationship with usefulness. In addition, SPSS self-efficacy also has a positive relationship with ease of use. Further, statistic learning value is positively related to usefulness. Finally, ease of use is positively related to behavioural intention to use SPSS. Out of eight hypotheses being developed, four hypotheses is supported and the rest is rejected. Theoretical and practical implication is discussed in this article.

1. Background of the study

Due to technological break-through that facilitate the individual learning, it therefore require the new form of delivery of learning and its contents [1]. Adoption of technology among students in learning is common. In accounting discipline, it uses of technology usually for subject of accounting information system [2]–[6]. In addition, technology adoption in learning is also in the subject of statistics. An important of statistic subject for business major students has been discussed by practitioners and academician. The statistic subject reflects the canonical exposure to research method and statistical assessment which many students may be useful for their careers [7]. The course in statistic has been equipped with statistics software, such as SPSS, Eview and etc. The statistic subject is an important skill that student should have due to this kind of analytical skill can enhance student ability to read, synthesize, interpret and reported of their final project.

[8] argues that statistic subject is one of the demanding and rigorous one, as a result awakening emotional and cognitive reactions that may slow down the level of performance. Statistic subject is among those that is sources of most anxiety, especially for students from social and humanise discipline

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[9], [10]. [7] add that student personal experience toward statistic can also cause anxiety. It creates the negative perception about courses in statistics. For accounting students (bachelor level), statistic subject would be useful for finishing their final project called "*skripsi*". However, many students fail to finish their final project on time because of lack of knowledge about statistic subject. Delay in finishing final project will influence the study tenure. University of Bung Hatta's accounting student can finish their final project and study on time is about 60%. The rest complete their study more than four years. One of problem why this happened is statistics. In delivery of this subject, it is equipped with statistic software (e.g. S.P.S.S). In addition, S.P.S.S practicum is continued in the subject of research methodology. The students are given a tabulation research data and they are asking to analyse the data using S.P.S.S. Thus, they are expected to use this software while finishing their final project. However, there is no studies why the accounting student intent to use S.P.S.S. By knowing the factors determining the intention to use S.P.S.S, the head of accounting department and dean for economic faculty can solve the problem. In addition, there is limited studies investigating the statistical software intention to use among students in accounting departement, especially in undergraduate Indonesia's students.

Using statistic software is a part of technology adoption. Technology usage can be understood by many perspectives both individual and organization level. In organization level, organization adopt the technology could be underpinned by technology-organization-environment [11], innovation diffusion theory [12], and tri-core model [13]. In addition, technology adoption in individual level can be understood by using theory of reason action [14], theory of plan behaviour [15], model for technology acceptance [16], and UTAUT [17], model of PC utilization [18], social cognitive theory [19], and combined TAM-TPB [20]. Previous studies on technology adoption among individuals has been researched [21]–[23].

Behavioural intention to use the SPSS among students have been documented by several researchers [1], [7], [24], [25]. [7] analyse an intention to use SPSS among social science student at three Slovenian's universities. The study uses the model for technology acceptance to understand the behavioural intention to use SPSS. They conclude that there is several external factors influence the traditional TAM variables (ease of use and usefulness) and ease of use and usefulness also positively related to behavioural intention to use S.P.S.S. [25] modify TAM by adding computer attitudes, statistic anxiety, and statistical software self-efficacy as determinants of ease of use and usefulness among MBA students. They find that computer attitudes and statistical self-efficacy has a positively significant on usefulness. [24] also investigate the four external factors (S.P.S.S learning value, social support, S.P.S.S self-efficacy, and statistic knowledge) as predictors of ease of use and usefulness and also analyse their impact on behavioural intention to use SPSS. Using S.P.S.S, [24] conclude that several external factors has a positive impact on ease of use and usefulness, and their impact on behavioural intention to use SPSS is also significant. [1] expand the technology acceptance model by adding three factors that are support, compatibility with academic need of student economic and business, and usefulness of statistics, as predictor of behavioural intention to use SPSS. Based on the literature above, two studies use SPSS as analyse tools [7], [24] and one study apply the SEM-PLS [1]. Besides, computer attitude as an external factor is used only by [7]. S.P.S.S self-efficacy is utilized by [7], [24] and the result is still inconclusive. Statistic learning value [7], [24] are also inconclusive. For example, [24] find that there is no relationship between statistic learning value and ease of use. However, [7] conclude that there is a significant effect of statistic learning value on ease of use. In brief, there is a gap in literature and need to analyse further. The objective of the study is to investigate the effect of computer attitude, SPSS self-efficacy, and statistic learning value on ease of use and usefulness. Besides, this study also analyses the influence of usefulness and ease of use on an intention to use SPSS among accounting students.

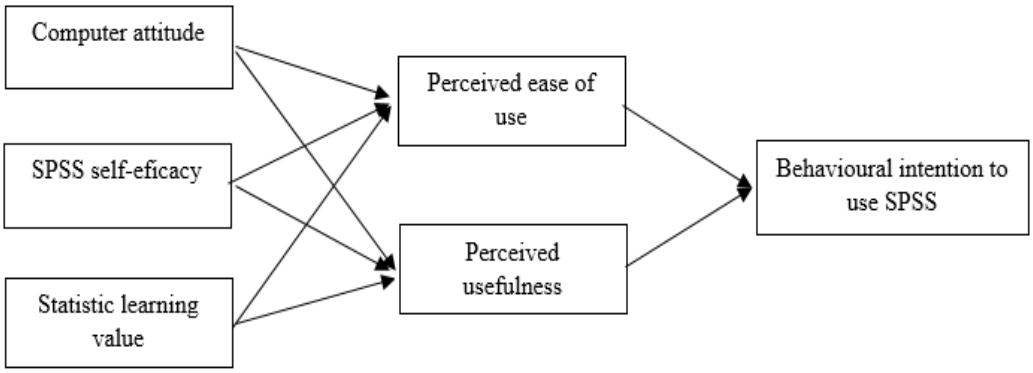

Figure 1. Research framework

Computer attitude refers to the extinct to which a student adores or does not adore about computers [7]. If the student likes a computer, he or she has a positive perception about usefulness and ease of use SPSS and she or he finally has an intention to use it. Self-efficacy of S.P.S.S refers to to belief that students has competence to run a statistical analysis using S.P.S.S [7], [24]. If a student has a high confident about using SPSS, it will be easy for he or her to use S.P.S.S and finally create an intention to use it. Statistic learning value refers to value of statistic learning, such as problem solving competency, stimulate his or her own thinking and etc [7]. If the students feel that statistic learning has certain value, they will perceive ease of use and usefulness to use S.P.S.S and finally build the intention to use SPSS. Perception about ease of use can be defined as the level of a student believes that using system (e.g. SPPS) would be free of effort [16]. In addition, perception about usefulness refers to the degree to which a person believes that using a certain system or application (e.g. S.P.S.S) would enhance his or her job performance[16]. If the students have confident about using SPSS and believes that S.P.S.S enhance their job performance, it will create the behavioural intention to use S.P.S.S. Previous findings [1], [7], [24] demonstrate the effect of external factors (computer attitudes, S.P.S.S self-efficacy, and S.P.S.S learning value) on perception about ease of use and usefulness, and their impact on behavioural intention to use SPSS. Based on the above explanation, we develop seven hypotheses as follow.

H1: Computer attitude has a positive relationship with perceived ease of use (PEU)
H2: Computer attitude has a positive association with perceived usefulness (PU)
H3: S.P.S.S self-efficacy is positively related to Perceived Ease of Use (PEU)
H4: S.P.S.S self-efficacy is positively related to Perceived Usefulness (PU)
H5: Statistic learning value has a positive association with Perceived Ease of Use (PEU)
H6: Statistic learning value has a positive association with Perceived Usefulness (PU)
H7: Perceived Ease of Use (PEU) has a positive relationship with intention to use SPSS
H8: Perceived Usefulness (PU) has a positive influence on intention to use SPSS

This paper is arranged as follow. The first part discusses about the study's background. Second part would be discussed about method and material. Next session is result and discussion and finally followed by inference and recommendation.

2. Research method

The object of this study is undergradute students, spesifically accounting students of Bung Hatta University which were registered at the research method subject in first session on academic year 2018/2019. There are 109 students taking this subject and 109 questioners distributed to them through on-line survey. Primary data gathered through survey is used in this study. Latent dependent variables are SPSS usage behavioural intention. intention to use SPSS has four items extended by [7]. Latent independent variables are computer attitudes, S.P.S.S self-efficacy, S.P.S.S learning value, perception about ease of use and usefulness. Perception about usefulness, computer attitudes, SPSS self-efficacy and SPSS learning value have five items each [7]. Finally, perception about ease of use has four items.

Variables use five-scale Likert starting with strongly disagree (1) and strongly agree (5). SEM-PLS is applied to analyse data. There are two model assessment in SEM-PLS: measurement model and structural model assessment [26]. Path coefficient and *P-value* are used to decline or admit the hypotheses. If p-value is lower than 0.05 (α=5%) and direction of path coefficient is expected, the hypothesis is supported and otherwise rejected [27].

3. Findings and Discussion

3.1. Demographic data

Detail of demographic variables that are gender, age, semester, CGPA are can be seen in Table 1 bellow.

Table 1. Demographic Data

Demographic data	Class	Count	%
Gender	Female	57.00	78.08
	Male	16.00	21.92
Age	19 to 20 years old	16.00	21.92
	21 to 22 years old	43.00	58.90
	23 to 24 years old	13.00	17.81
	> 24 years old	1.00	1.37
Semester	5th to 6th	38.00	52.05
	7th to 8th	26.00	35.62
	> 8th	9.00	12.33
CGPA	2.00 to 2.50	1.00	1.37
	2.51 to 3.00	13.00	17.81
	3.01 to 3.50	45.00	61.64
	3.51 to 4.00	14.00	19.18

Seventy-three students (66.97%) were participating in this research. For gender, fifty-seven students are female (78.08%) and the rest are male 16 students (21.92%). Sixty-six students are those with age of 19 to 20 years old (21.92%). In addition, 43 students have age of 21 to 22 years old (58.90%). Followed by age of students is ranged of 23 to 24 years old around 13 students (17.81%). The rest is student with age higher than 24 years old is only one student (1.37%). Regarding to the semester, thirty-eight students (52.05%) in the 5th to 6th semester, followed by twenty-six students (35.62%) in semester 7th to 8th semesters and the rest is above semester eight around 9 students (12.33%). According to CGPA, students are nominated by CGPA of 3.01 to 3.50 (61.64%). It followed with CGPA of 3.51 to 4.00 (19.18%), 2.51 to 3.00 (17.81%), and 2.00 to 2.50 (1.37%).

3.2. Assesment of measurement model

There are two assessments in SEM-PLS (smart-pls) that are measurement model and structural model assessment [26]. Table 2 provides us with assesment result for measurement model. It consists of two kind of validities: convergent validity and discriminant validity [28]. There are four smart-pls properties used to assess the measurement model: outer loading, Cronbach's Alpha (CA), composite reliability (CR) and AVE. Outer loading for all constructs have value greater than 0.700 [29]. One item for behavioural intention construct is deleted due to its outer loading below 0.700 (bi3). Cronbach's alpha and composite reliability are used to assess the internal consistency and the result show that these value are above 0.700 [30]. Finally, last convergent validity criteria is average variance extraction (AVE) and all construct has value of AVE above 0.500 [30].

Table 2. Convergent validity

Construct	Items	Outer Loading	CA	CR	AVE
Behavioural intention	bi1	0.878			
	bi2	0.847	0.813	0.889	0.728
	bi4	0.834			
	ca1	0.847	0.921	0.940	0.759

Computer attitude	ca2	0.891			
	ca3	0.894			
	ca4	0.834			
	ca5	0.888			
Perceived ease of use	peu1	0.831	0.929	0.950	0.827
	peu2	0.940			
	peu3	0.952			
	peu4	0.909			
Perceived usefulness	pu1	0.910	0.925	0.944	0.771
	pu2	0.858			
	pu3	0.931			
	pu4	0.865			
	pu5	0.821			
S.P.S.S self-efficacy	slc5	0.921	0.917	0.938	0.753
	slv1	0.910			
	slv2	0.890			
	slv3	0.890			
	slv4	0.834			
Statistic learning value	sse1	0.783	0.934	0.950	0.791
	sse2	0.916			
	sse3	0.908			
	sse4	0.897			
	sse5	0.825			

Second assessment for measurement model is discriminant validity. Following [26] suggest that to assess the discriminant validity, researcher can use Fornell-Lacker criterion, and cross loading. Table 3 presents the result of Fornell-Lacker criterion. The square root of a construct should be greater than its correlation coefficient with other construct [31]. For example, square root of computer attitude construct is 0.871 (bold) and this value is greater than the correlation coefficient of Computer attitude with perceived ease of use (0.555), perceived usefulness (0.693), S.P.S.S self-efficacy (0.766), and statistic learning value (0.590). Based on the result, it can be concluded that discriminant validity is reached.

Table 3. Discriminant validity-Fornell-Lacker Criterion

Construct	BI	CA	PEU	PU	SSE	SLV
Behavioural Intention (BI)	**0.853**					
Computer Attitude (CA)	0.589	**0.871**				
Perceived Ease of Use (PEU)	0.818	0.555	**0.909**			
Perceived Usefulness (PU)	0.659	0.693	0.713	**0.878**		
SPSS Self-Efficacy (SSE)	0.699	0.766	0.725	0.698	**0.868**	
Statistic Learning Value (SLV)	0.517	0.590	0.521	0.678	0.666	**0.890**

Table 4. Discriminant Validity-Cross Loading

Items	BI	CA	PEU	PU	SSE	SLV
bi1	**0.878**	0.556	0.686	0.651	0.532	0.603
bi2	**0.847**	0.427	0.646	0.568	0.337	0.497
bi4	**0.834**	0.517	0.756	0.472	0.446	0.679
ca1	0.441	**0.847**	0.360	0.523	0.471	0.585
ca2	0.508	**0.891**	0.435	0.585	0.553	0.706
ca3	0.481	**0.894**	0.439	0.580	0.472	0.633
ca4	0.537	**0.834**	0.576	0.582	0.432	0.682
ca5	0.571	**0.888**	0.562	0.716	0.622	0.707
peu1	0.659	0.562	**0.831**	0.735	0.479	0.623
peu2	0.798	0.481	**0.940**	0.622	0.384	0.595
peu3	0.755	0.504	**0.952**	0.645	0.510	0.708

peu4	0.760	0.480	**0.909**	0.604	0.518	0.706
pu1	0.581	0.646	0.615	**0.910**	0.595	0.624
pu2	0.541	0.503	0.600	**0.858**	0.576	0.568
pu3	0.683	0.649	0.684	**0.931**	0.691	0.677
pu4	0.584	0.603	0.653	**0.865**	0.580	0.563
pu5	0.487	0.636	0.573	**0.821**	0.519	0.627
slc5	0.465	0.508	0.479	0.637	**0.921**	0.579
slv1	0.384	0.497	0.446	0.603	**0.910**	0.597
slv2	0.561	0.577	0.478	0.620	**0.890**	0.701
slv3	0.453	0.544	0.424	0.583	**0.890**	0.556
slv4	0.430	0.499	0.485	0.568	**0.834**	0.524
sse1	0.631	0.541	0.752	0.582	0.525	**0.783**
sse2	0.665	0.651	0.713	0.625	0.655	**0.916**
sse3	0.612	0.765	0.572	0.696	0.659	**0.908**
sse4	0.541	0.730	0.535	0.599	0.595	**0.897**
sse5	0.562	0.641	0.531	0.503	0.424	**0.825**

Following discriminant validity assessment is cross loading. In addition, the assessment for cross-loading is the loading an indicator (item) on its assignment latent variable should be above the loading on all other latent variables [26]. For example, loading the items of behavioural intention (bi1=0.878, bi2=0.847, and bi3=0.834) is higher (bold) than loading of these items on all other latent variable (CA, PEU, PU, SSE, and SLV). The result (see Table 4 above) shows that cross-loading of all construct. It can be concluded that discriminant validity is achieved.

3.3. Assesment of structural Model

Following model assessment is structural model assessment. The result of structural model assessment can be seen in Table 6 below. There are two kinds of aspect is being assessed. First, the predictive power and relevance of the model. Second, path coefficient and p-value of construct relationship. In this model, we have three endogenous constructs: behavioural intention, perceived ease of use, and perceived usefulness. predicting purpose using smart-pls need a measure of predictive capability: predictive relevance and predictive power [32]. Predictive relevance uses the Q square and its value must be greater than 0.000. As shown in Table 6, all endogenous constructs have Q square greater than 0.000. In fact, the model has large predictive relevance for all endogenous constructs [33]. Second predictive capability is measured by predictive power applying R square. It can be seen from result in Table 6, R square for all endogenous constructs are above 0.500. They are categorised as moderate predictive power [27].

Structural model assessment is used to test hypothesis. Table 6 also presents the hypotheses testing. The effect of computer attitudes on perceived behaviour is not supported because of its p-value is greater than 0.05 (H1-rejected). In contrast to above finding, the relationship between computer attitudes and perceived usefulness is supported due to lower p-value (0.005). It can be concluded that second hypothesis is supported (H2-accepted). In addition, the effect of SPSS self-efficacy on perceived ease of use is significant (β=0.690, p-value=0.000) and the hypothesis is supported (H3-accepted).

Table 5. Structural Model

Endogenous Constructs	Q^2	Decision	R^2	Decision
Behavioural Intention	0.462	Large	0.681	Moderate
Perceived Ease of Use	0.404	Large	0.529	Moderate
Perceived Usefulness	0.432	Large	0.610	Moderate
Relationship	**Path coef.**	**t statistic**	***P value***	**Conclusion**
Computer Attitude -> Perceived Ease of Use	-0.014	0.132	0.895	Rejected
Computer Attitude -> Perceived Usefulness	0.319	2.799	0.005	Accepted
Perceived Ease of Use -> Behavioural Intention	0.709	5.950	0.000	Accepted
Perceived Usefulness -> Behavioural Intention	0.154	1.040	0.299	Rejected

SPSS Self-Efficacy -> Perceived Ease of Use	0.690	6.110	0.000	Accepted
SPSS Self-Efficacy -> Perceived Usefulness	0.230	1.577	0.115	Rejected
Statistic Learning Value -> Perceived Ease of Use	0.069	0.608	0.544	Rejected
Statistic Learning Value -> Perceived Usefulness	0.336	3.225	0.001	Accepted

The relationship between SPSS self-efficacy and perceived usefulness is not significant. Therefore, the hypothesis is not supported (H4-rejected). Further, the effect of statistic learning value on perceived ease of use and perceived usefulness. The result shows that statistic learning value does not have a significant effect on perceived ease of use (β=0.069, p-value=0.544) (H5-rejected). In contrast, statistic learning value has a positive relationship with perceived usefulness (β=0.366, p-value=0.001) (H6-accepted). Finally, the relationship between perceived ease of use and behavioural intention is significant statistic learning value does not have a significant effect on perceived ease of use (β=0.709, p-value=0.000) (H7-accepted). In contrast, the association between perceived usefulness and behavioural intention is not significant statistic learning value does not have a significant effect on perceived ease of use (β=0.164, p-value=0.299) (H8-rejected). Figure 3 show the structural model.

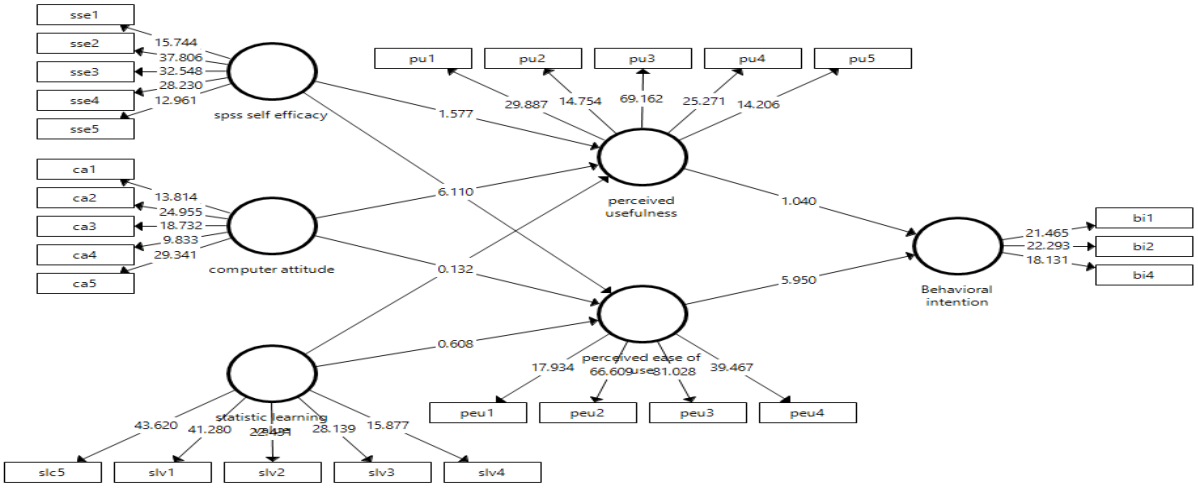

Figure 2. Structural model

In contrast to earlier finding [7], this study found that there is no significant effect of computer attitudes on perceived ease of use. However, this finding is in agreement with [25] finding which show that there is no significant relationship between computer attitudes and perceived usefulness. The result of second hypothesis is that there is a significant effect of computer attitudes on perceives usefulness. This finding is consistent with [7], [25]. In addition, S.P.S.S self-efficacy does not have a significant relationship with perceived usefulness and this finding is consistent with [7], [24], [25] which found that SPSS self-efficacy has positive relationship with perceived usefulness. However, the effect of SPSS self-efficacy on perceived ease of use is positive and significant and this finding is in line with [7] and not supported by [24], [25]. It can be concluded that there is no significant effect of SPSS self-efficacy on perceived ease of use. Further, no effect of statistic learning value on perceived ease of use is consistent with [24] but not in agreement with [7]. Finding of significant effect of statistic learning value on perceived usefulness is supported by [7], [24]. Next, positive and significant effect of perceived ease of use on behavioural intention to use SPSS is coherent with [1], [7], [24], [25]. Finally, no significant effect of perceived usefulness on behavioural intention to use SPSS is not consistent with findings of [1], [7], [24], [25]. The present study makes several noteworthy contributions to current literature on behavioural intention to use technology.

4. Conclusion and Recommendation

Behavioural intention to use SPSS has been done by several researchers. However, there is no studies investigating behavioural intention to use SPSS among undergraduate students, especially in Indonesia. This paper researched the effect of external factors (computer attitudes, SPSS self-efficacy, and statistic learning value) on perceived ease of use and perceived usefulness as well as its impact on behavioural intention to use SPSS. The result shows that four hypotheses are supported (H2, H3, H6 and H7). From theoretical contribution, this study presents enormous contribution toward the existing literature on behavioural intention to use. This paper provides highlights on the existing relationship between external factors and TAM's variables (PEU and PU). In addition, highlight on the effect of perceived ease of use and perceived usefulness on behavioural intention to use SPSS. Practically, the positive effect of computer attitudes on perceived usefulness implies that to increase the student's perceived usefulness of SPSS, the accounting department of Bung Hatta University has to improve the student's attitude toward computer by informing the student about computer, such as computer can enhance the standard of living, bring to bright new era and etc. In addition, the positive effect of SPSS self-efficacy on perceived ease of use implies that accounting department can increase the perceived ease of use SPSS by building the student's confident about using SPSS. For example, department can ask someone to accompany students on using SPSS. Statistic learning value is positively related to perceived usefulness. It implies that student perceived usefulness can be increased by increasing the statistic learning value. For example, the head of accounting department socializes the students that statistic learning can stimulate their thinking, help to solve problem and etc. Finally, perceived ease of use has a positive relationship with behavioural intention to use SPSS. It indicates that behavioural intention to use SPSS can be improved by increasing the student perceived ease of use, such as easy to get SPSS. Several limitations to this study need to be acknowledged. The research object only uses the accounting students taking the courses of research method. In addition, behaviour intention to use SPSS is seen from technology acceptance model (TAM). Future research should therefore concentrate on research object by widening the research object from students from other department, such as management and economics studies. Thus, future research might also investigate behavioural intention to use SPSS by using other perspective, such as the unified theory acceptance and use of technology (UTAUT).

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