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Canonical Correlations on Positive and Negative Attitudes of Computer-Based Statistics among Business Students

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Abstract

This study aims to investigate the canonical relationship between positive and negative attitudes of economics and business students when using computer-based analytical tools. The subjects of this study were students of the Faculty of Economics and Business in Medan. Samples were taken from two universities, including state universities and private universities. Using a random sampling technique, this study collected 247 responses, consisting of 47 male and 200 female respondents. The data in this study were collected using a questionnaire with a 5-Likert scale and analyzed by canonical correlation. The results of the canonical correlation analysis in this study revealed that Perceived Usefulness (PU) and Perceive Enjoyment (PE) were critical predictors of the construct set of positive attitudes. At the same time, Strain (ST) and Negative Affectivity (NA) were essential predictors of the formation of negative attitudes among users when using computer-based statistical tools. This study produces a new insight related to attitude toward Information Technology (IT) in a specific task, namely statistical analysis. This study also has practical recommendations for universities and lecturers to invest in and use statistical software that is easy and convenient for teaching statistics.

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INTRODUCTION

The advent of information technology (IT) has led to the creation of a plethora of digital devices, which in turn has necessitated a continuous enhancement of the productive work of individuals through the exploitation of these digital devices. It is noteworthy that not all individuals or organizations are able to swiftly leverage IT to gain a competitive advantage. These lags are often related to three aspects: IT as infrastructure (Singh et al., 2016) human resources (HR) as users (Natarajan et al., 2015; Shadkam, 2017; Sun et al., 2017) and task characteristics that give rise to IT interactions with its users (Oehlhorn et al., 2020). It can be assumed that IT is a natural part of people's daily lives due to the pressure of diffusion of innovation (Asiri et al., 2024). Therefore, the HR aspect and task characteristics are essential factors in highlighting the impact of technological attacks on human life.

Universities are of critical importance with regard to the advancement of human resources. As an institution responsible for the production of intellectuals, universities must equip their students with the ability to adapt and excel in the utilisation of information technology (Baygin et al., 2016). In an optimal scenario, the integration of IT into the learning environment would provide students with the necessary support to complete their productive tasks. However, individuals who utilize information technology, including students, exhibit disparate responses to computers with regard to both acceptance and adoption (Sagala et al., 2017). In some instances, this has manifested as rejection (Effiyanti & Sagala, 2018; Rolon, 2014). The acceptance of IT is typically associated with its perceived usefulness in facilitating productive or recreational tasks (Nastjuk et al., 2024). In contrast, rejection may stem from a lack of familiarity with computers or from more profound anxieties, such as an excessive fear of computer technology, also known as "computerphobia" (Abbasi & Tabatabaee-Yazdi, 2021). Indeed, the rejection of IT tools is now uncommon, given that they have become a necessity for the majority of people. Nevertheless, specific IT functions, such as data analysis software, can still present a challenge to comprehension, resulting in rejection (Sagala et al., 2021). This anxiety may be attributed to the user's cognitive limitations or even the pressure resulting from tasks that necessitate the utilization of the application. In certain circumstances, this may give rise to concerns pertaining to an excessive workload, work-life balance, and privacy issues, among others (Effiyanti & Sagala, 2018; Laspinas, 2015).

Moreover, students frequently experience anxiety and stress when confronted with tasks that necessitate the calculation and generation of statistical data (Nguyen et al., 2016; Sagala et al., 2021; Warwick & Howard, 2016). This phenomenon is referred to as "statistical anxiety". Lorenzo-Seva et al. (2022) defined statistical anxiety as a feeling of anxiety experienced when taking statistical courses or performing statistical analysis, including the collection, processing, and interpretation of data. Anxiety may manifest as feelings of restlessness, depression, and stress symptoms when studying statistics (Levpušcek & Cukon, 2022). Despite the assistance of information technology, the statistical data should be readily available for analysis (Nazliati et al., 2019). Computer-based data analysis tools facilitate the calculation of data collected. However, the user must possess the requisite ability to operate the software and interpret the output of the computational results derived from the data obtained. Therefore, the ability to utilize computer-based statistics is distinctive, and the user's responses are undoubtedly disparate from those elicited by the use of IT in general.

The objective of this study is to examine the canonical relationship between positive and negative attitudes toward computer-based statistical tools among business students. The canonical analysis will yield the value of the relationship between the two sets of constructs, thereby revealing which variates are predominantly responsible for constituting the two sets of constructs (Hair et al., 2019).

This study will utilize the variables perceived usefulness (PU), perceived ease of use (PEU), and perceived enjoyment (PE) to form a set of positive attitude constructs, as proposed by Davis (1989), Davis et al. (1989), and Venkatesh & Davis (2000). In contrast, the variables included in the set of negative attitude constructs are computer anxiety (CA), strain (ST), and negative affectivity (NA) (Effiyanti & Sagala, 2018; Laspinas, 2015). The attitude of end-user computing is an essential factor contributing to IT acceptance (Kim & Wang, 2021). Therefore, positive or negative responses from students to IT presence will affect the acceptance and adoption of IT (Sagala et al., 2017). In this case, students will provide implications beyond IT in general but IT with specific functions, namely statistics software.

In general, previous studies have indicated a negative correlation between the two sets of constructs. Nevertheless, there are two reasons why this study is imperative. First, the nature of statistical applications differs from that of IT in general, even among those IT applications oriented toward productivity (Nguyen et al., 2016; Warwick & Howard, 2016). Secondly, this study aims to further examine the variables that comprise the two sets of constructs in the context of digital natives (Hutchins, 2021). It is possible that the identified phenomena may change, resulting in differing levels of acceptance and rejection due to variations in relative conditions. Moreover, the constructs employed in this study represent fundamental and reliable constructs that have been repeatedly tested by previous researchers. Consequently, this research will also re-examine the reliability of these constructs to capture phenomena in the digital era that may possess a different nature than when the constructs were initially developed.

The variables of PU, PEU, and PE are derived from the Technology Acceptance Model (TAM) The concept of IT acceptance has a long history of development and empirical testing. In 1989, Davis and Davis et al. developed the TAM to explain aspects of user behavior in the acceptance and adoption of IT. The TAM employs PU and PEU as pivotal variables in the context of information technology acceptance. These two variables are frequently employed by information systems researchers to assess the likelihood of user acceptance of an IT system. PU refers to the extent to which users perceive that an IT will facilitate the completion of their tasks and enhance performance, whereas PEU pertains to the extent to which users believe that an IT is straightforward to learn and operate (Astari et al., 2022; Davis, 1989; Davis et al., 1989).

As the field of study evolved, Venkatesh & Davis (2000) refined the construct by adding PE as a new element to consider in the context of IT acceptance. PE, or pleasure in the experience of using IT, is a construct that has been shown to be a useful addition to the existing models of user acceptance of information technology (Venkatesh & Davis, 2000). The use of these three constructs is considered more complete because, in addition to having a more comprehensive range of behaviours, PE use can also reach utilitarian and hedonic aspects in reviewing user attitudes towards the use of ICT (Sagala & Sumiyana, 2020).

Conversely, the rejection of IT is typically classified into two categories: anxiety and stress. These constructs are derived from the concept of ”computerphobia,” which elucidates how end-users experience trepidation and apprehension when utilizing computers as novel work devices (Abbasi & Tabatabaee-Yazdi, 2021). CA typically manifests when the user is on the verge of or engaged in interaction with IT. Previous researchers have discussed this phenomenon using the term ”technostress”. While focus typically manifests subsequent to IT usage, previous researchers have designated it as technostress. Technostress is a phenomenon that arises due to the presence of information technology, which exerts a certain degree of pressure. This pressure can emanate from a multitude of sources, including user cognitive limitations, task overload, job insecurity, work-life balance, and work-family balance (Effiyanti & Sagala, 2018; Laspinas, 2015). Technostress is typically examined through the lens of two constructs: stress and anxiety (Effiyanti & Sagala, 2018).

This study will comprehensively associate and test the two sets of constructs. A comprehensive view of positive and negative attitudes will provide educators with a reference point for developing statistical courses that are more accessible and acceptable to students. Concurrently, educators are able to make well-informed decisions regarding the selection of specific statistical software as a learning medium in statistical classes. Additionally, each set of constructs is represented by a comprehensive and parsimonious variate that considers hedonic, utilitarian, user experience, and post-use attitudes. Moreover, this study employs canonical analysis to achieve its objective. Canonical analysis can assess the optimal composites from a set of constructs and evaluate their associations with other groups of constructs (Hair et al., 2019). This study presents a comprehensive yet parsimonious explanation of the phenomenon of attitudes towards using computer-based statistics among students in the economics and business faculties.

METHODS

The subjects of this research are students enrolled in the Faculty of Economics and Business at the University of Medan. The study employed a cross-sectional design, with samples drawn from two distinct types of universities: state-owned and private. This study employs a random sampling technique to obtain a representative sample from the population. The data were collected via electronic questionnaires, which were distributed to the target respondents in order to facilitate accessibility. A total of 247 responses were collected, comprising 47 male and 200 female respondents. The data were subsequently tabulated and analyzed using canonical correlation. The use of canonical correlation is intended to examine the relationship between sets of positive and negative attitude constructs on student attitudes towards computer-based statistics and identify which variates contribute to forming the two groups of constructs (Hair et al., 2019). Further detailed information about the characteristics of the respondents is provided in Table 1.

The instrument utilized in this study was adapted from several previous studies. The positive attitude construct was based on the PU and PEU constructs, which were adapted from the work of Davis et al. (1989), while the PE construct was adapted from the research of Venkatesh & Davis (2000). Moreover, the negative attitude construct set was adapted from the following sources: CA (Heinssen Jr et al., 1987), ST (Moore, 2000), and the NA (Agho et al., 1992). The adaptation was carried out with several changes to align with the characteristics of the respondents and the needs of this research. The question items are designed with a 5-point Likert scale to measure the respondents' perceptions of the attitudes in question.

Table 1. Demography of Sample

Variable	n	%
Gender		
Male	47	19 %
Female	200	81 %
Total	247	
Age		
18-19	49	20 %
20-21	100	40 %
22-23	98	40 %
Total	247	
University		
Public	165	67 %
Private	82	33 %
Total	247	

Source: Processed Primary Data (2024)

RESULT AND DISCUSSION

As illustrated in Table 2, the correlation matrix reveals that the correlation coefficient of variables within a set of constructs is relatively high. However, this is not the case for variables between sets of constructs, namely positive and negative attitudes. Notably, the correlation of variables between sets of constructs (positive attitudes: PU, PEU, PE; negative attitudes: CA, ST, NA) yielded negative coefficients. This indicates that PU, PEU, and PE are negatively associated with CA, ST, and NA. This finding is theoretically appropriate. Individuals with a positive attitude towards the use of IT indeed tend not to experience negative attitudes, and vice versa. Furthermore, it is necessary to review further how the relationship varies if the variables are evaluated in a set of constructs and which variables dominantly make up the construct set. Thus, the data analysis continued with canonical correlation.

Table 2. Correlation Matrix

	PU	PEU	PE	CA	ST	NA
PU	1					
PEU	0.638**	1				
PE	0.605**	0.705**	1			
CA	-0.196**	-0.191**	-0.249**	1		
ST	-0.301**	-0.200**	-0.260**	0.691**	1	
NA	-0.284**	-0.236**	-0.304**	0.601**	0.680**	1

Source: Processed Primary Data (2024)

Table 3. The Results of Canonical Analysis

Measures of Overall Model Fit for Canonical Correlation Analysis			
Canon Correlation	Canonical R^2	F-Statistics	Probability
0.352	0.123	4.310	0.000
0.152	0.023	1.428	0.223
0.003	0.000	0.003	0.955
Multivariate Test of Significance			
Test Name	Value	Approx. F	Sig. of F
Pillai's trace	0.147	4.178	0.000
Hotelling's trace	0.165	4.400	0.000
Wilk's lambda	0.855	4.310	0.000
Roy's gcr	0.123		

Source: Processed Primary Data (2024)

The results of canonical correlation analysis in this study resulted in three canonical equations. Of the three equations, it was found that only the first equation had a significant correlation with a canonical coefficient of 0.352 at <0.05. Thus, further data analysis will refer to the first canonical function. Furthermore, simultaneous multivariate significance testing was carried out by reviewing the results of Pillai's trace, Hosteling's trace, Wilk's lambda, and Roy's gcr test results. The test results show that the canonical correlation model is statistically significant at <0.05. The results of canonical correlation analysis can be seen in Table 3.

Moreover, the redundancy index value was identified as a means of deepening the canonical test. The redundancy index was examined to ascertain the degree of association between the independent canonical variables and the set of dependent constructs, and vice versa (Hair et al., 2019). The redundancy index values for both dependent and independent variables are relatively low, at 0.089 and 0.083, respectively. Indeed, there is no universal indicator that can determine whether the redundancy index in the canonical correlation is relatively large or small (Hair et al., 2019). However, researchers have noted that this figure is relatively small. Two factors contribute to the low redundancy index. First, there is a low quadratic number of canonical coefficients. Second, there is a low quadratic canonical loading on the CA variable on the dependent variable and PEU on the independent variable. This fact produces value in this research. Further detail will be provided regarding this second reason.

Table 5 presents the standardized canonical weights, canonical loadings, and cross-loadings of all canonical variates for both the dependent and independent variables. The figures for the three indicators will represent the relative contribution of the composite to the variate (Hair et al., 2019). In the independent variable, it is evident that CA exhibits a relatively low canonical weight of 0.009, whereas ST and NA demonstrate a moderate canonical weight of -0.502 and -0.595, respectively. The trend persists in the canonical loading and cross-loading figures, although they appear to be more favorable. CA exhibits a moderate canonical loading of -0.695, while ST and NA demonstrate high canonical loadings of -0.900

Table 4. Redundancy Analysis for The First Function

Variate	Canonical Loading	Canonical Loading Squared	Average Loading Squared	Canonical R2	Redundancy Index
Dependent Variables					
CA: Computer Anxiety	-0.695	0.483			
ST: Strain	-0.900	0.810	0.720	0.123	0.089
NA: Negative Affectivity	-0.931	0.867			
Dependent Variate		1.647			
Independent Variables					
PU: Perceive Usefulness	0.903	0.815			
PEU: Perceive Ease of Use	0.680	0.462	0.683	0.123	0.083
PE: Perceive Enjoyment	0.878	0.771			
Independent Variate		2.049			

Source: Processed Primary Data (2024)

and -0.931, respectively. Based on this figure, it can be inferred that ST and NA predominantly constitute the negative attitude construct set using computer-based statistics.

Furthermore, the results demonstrated that PU and PE exhibited relatively moderate canonical weights of 0.636 and 0.597, while PEU demonstrated comparatively low canonical weights of -0.147. As with the dependent variable, this trend is also evident in the canonical loading and cross-loading figures, where PU and PEU have high canonical loadings of 0.903 and 0.878, respectively. In contrast, PEU has moderate canonical loadings of 0.680. Therefore, it can be concluded that PU and PE form a dominant set of positive attitude constructs regarding the use of computer-based statistics.

Validation and Diagnosis

In order to ascertain the validity of the canonical correlation model, this study conducted a sensitivity analysis on the set of independent variables (Hair et al., 2019). A sensitivity test is conducted by calculating the correlation model with the removal of one independent variable. The test was conducted three times, and observations were made by reviewing the consistency of the correlation model and the canonical loading of each construct. In the first test, the variable "perceived usefulness" (PU) was removed from the model. In the second test, the variable "perceived ease of use" (PEU) was removed from the model. In the third test, the variable "perceived enjoyment" (PE) was removed from the model. As shown in Table 6, this study's canonical correlation and canonical loading values were stable and consistent in all three tests, as well as in comparison to the complete variate model.

Canonical correlation analysis is typically employed for two principal reasons: (1) Identifying the correlation between groups of variables or sets of dependent and independent constructs; and (2) identifying the weights of the covariate dimensions which form the construct set (Hair et al., 2019). From an attitudinal perspective, this enables the researcher to comprehend the configuration of the set of variables that may fluctuate and the interrelationship between these variables and the dependent variable (Hair et al., 2019). These variables are undoubtedly linear in nature, which is the objective of this research. The results of the canonical analysis indicate that there is one canonical equation that shows a significant relationship between the two canonical variables. Consequently, the focus of the investigation is limited to the first equation.

Table 5. Canonical Weights, Loadings, and Coss-Loadings

Variate	Canonical Weights	Canonical Loadings	Canonical Cross-Loadings
Dependent Variables			
CA: Computer Anxiety	0.009	-0.695	-0.244
ST: Strain	-0.502	-0.900	-0.352
NA: Negative Affectivity	-0.595	-0.931	-0.327
Independent Variables			
PU: Perceive Usefulness	0.636	0.903	-0.317
PEU: Perceive Ease of Use	-0.147	0.680	-0.239
PE: Perceive Enjoyment	0.597	0.878	-0.309

Source: Processed Primary Data (2024)

Table 6. Sensitivity Analysis

Variate	Complete Variate	Result after Deletion of		
		ST1	ST2	ST3
Canonical Correlation	0.352	0.319	0.350	0.324
Canonical Root	0.123	0.102	0.123	0.105
Dependent Variables				
CA: Computer Anxiety	-0.695	-0.782	-0.704	-0.626
ST: Strain	-0.900	-0.818	-0.895	-0.927
NA: Negative Affectivity	-0.931	-0.959	-0.935	-0.893
Shared Variance	-0.842	-0.853	-0.845	-0.815
Redundancy Index	-0.296	-0.272	-0.296	-0.264
Independent Variables				
PU: Perceive Usefulness	0.903	Ommited	0.905	0.995
PEU: Perceive Ease of Use	0.680	0.769	Ommited	0.71
PE: Perceive Enjoyment	0.878	0.995	0.886	Ommited
Shared Variance	0.820	0.882	0.896	0.853
Redundancy Index	0.289	0.281	0.313	0.276

Source: Processed Primary Data (2024)

This study builds upon and expands upon previous research findings that have indicated a robust correlation between positive and negative attitudes towards information technology systems (Effiyanti & Sagala, 2018). Prior research has demonstrated that the relationship between positive and negative attitudes can manifest in either a positive association or a negative association (Effiyanti & Sagala, 2018). Nastjuk et al. (2024) discovered that individuals with high levels of computer self-efficacy are more susceptible to experiencing technostress. Therefore, a positive attitude towards IT, which is manifested as a cognitive belief, effectively gives rise to a negative attitude in the context of stress and tension. This occurs because individuals with proficient computer skills are assigned significant workloads, resulting in work overload. This further disrupts their work rhythm, subsequently affecting their work-life and work-family balance (Nastjuk et al., 2024). A disruption of the work-life balance and work-family balance will eventually result in anxiety when interacting with technology, as the majority of work instructions originate from IT-related sources, such as mobile phones or computers. These circumstances then give rise to technostress.

In addition, the negative association identified by Effiyanti & Sagala (2018) can be attributed precisely to the cognitive limitations of the research subject's computer. Those who lack the requisite skills to utilise a specific computer-based task are less likely to view computers as a viable tool for work. Consequently, users encounter difficulties in developing positive and negative attitudes towards computers. This phenomenon then gives rise to CA, which in turn affects technostress (Effiyanti & Sagala, 2018). Accordingly, the nature of the association, whether positive or negative, will be contingent upon the characteristics of the sample. Nevertheless, the strength of the association between the two variables has consistently been found to be significant, whether in a positive or negative form. The current study identified a positive association, which suggests that the respondents in this study can be reasonably assumed to be technology-established IT users. This assumption will be discussed in the examination of each set of constructs.

Moreover, the attitudes of IT users, both positive and negative, have a number of implications for computer-integrated work practices. The perceived usefulness of a technology is significantly influenced by Moreover, the attitudes of IT users, both positive and negative, have a number of implications for computer-integrated work practices. The perceived usefulness of a technology is significantly influenced by both positive and negative attitudes (Laily & Riadani, 2019). Attitudes toward computers exert a profound impact on perceived performance (Sithipolvanichgul et al., 2021). Moreover, Hermanto & Patmawati (2017) discovered that PU has a positive impact on attitudes toward computer use. In another study, subjects with a more positive attitude demonstrated superior performance than subjects with a negative attitude (Li et al., 2023). Furthermore, a positive attitude engenders a more favorable perception of the system and augmented IT acceptance and usage (Albayati, 2024). In general, the canonical model of this research can be seen in Figure 1.

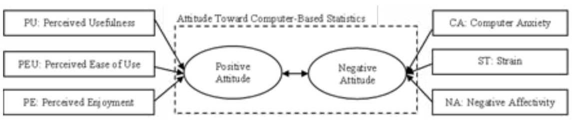

Figure 1. Canonical Model

In examining the influence of composite variables on independent variables, it becomes evident that PU and PE represent the most effective composites. Conversely, PEU is the least robust composite, despite exhibiting a high loading weight (>0.6) in terms of both loading and cross-loading. These findings corroborate and refine the findings of the study by Davis et al. (1989) regarding the TAM. The results indicated that PU plays a significant role in shaping attitude toward acceptance, while PEU does not. If we consider the respondents to be digital natives, it is possible that they will perceive the use of IT as straightforward. This occurs because individuals who are referred to as "digital natives" are born into an era that allows them to interact with information technology from an early age (Hutchins, 2021). As a result, computer self-efficacy is formed naturally, facilitating interaction with any IT (Rosli & Saleh, 2023). Consequently, acceptance indicators related to convenience are rendered irrelevant in IT acceptance, given that users have interacted with IT in their daily lives.

The results of this study also demonstrate the preeminence of the PU and PE composites. These findings indicate a positive attitude toward the strategic use of IT, derived from the perceived value of benefits and sensations of pleasure generated by the IT in question. From the perspective of computer-based statistics, IT users may perceive that the time and effort previously spent on data analysis can be redirected towards utilising statistical software. The deployment of IT has the effect of reducing the amount of time and energy expended on tasks, whether in terms of the amount of energy used or the time taken to complete a given task. Moreover, the statistical software utilized may possess a design and a set of features that users can find enjoyable when employed for data analysis. The performance of the data analysis software will engender a sensation of pleasure when it is able to resolve the user's statistical issues. In this context, the concepts of PU and PEU are inextricably linked. The advantages offered by computer-assisted analysis tools provide users with a positive experience throughout the process of using the tool, which in turn encourages continued use as it meets the user's data analysis needs. The study not only corroborates the findings of Davis (1989) and Davis et al. (1989) and extends the TAM proposed by Venkatesh & Davis (2000). Nevertheless, it indirectly corroborates the assertion that IT alignment is a pivotal element in the utilization of IT, in addition to its acceptance (Holdack et al., 2022). This study indicates that the suitability of the IT function in completing specific tasks in data analysis is a distinctive value of data analysis software that fosters a perception of usefulness and a sensation of enjoyment among its users.

One of the three composite variables exhibits a poor loading in the dependent variable, specifically: CA. This finding suggests that CA is not a crucial component of the negative attitude toward computer-based analysis tools. The phenomenon of CA is no longer prevalent among individuals belonging to the generation of digital natives. These findings differ from those of Effiyanti & Sagala (2018), who surveyed teachers who are not digital natives. The researchers concluded that CA represents an obstacle to the completion of productive work. Similarly, the findings of (Ong & Johnson, 2023) with professional business respondents align with this conclusion. However, this phenomenon may shift with different user characteristics. As previously discussed, digital natives have IT capabilities formed naturally (Hutchins, 2021) so that anxiety when interacting no longer occurs. Nevertheless, the sensation of tension and negative affectivity remains a possibility. This sensation does not solely originate from the IT, but also stems from the task functions that integrate with the use of the IT.

The findings of this study corroborate those of previous research by (Effiyanti & Sagala, 2018; Laspinas, 2015) in demonstrating that negative attitudes towards the use of computer-assisted statistical analysis tools are predominantly shaped by two key factors: ST and NA. The results of these studies, along with the present study, indicate that negative attitudes are not a result of users' cognitive limitations but rather stem from other factors. One such factor is the users' existing computer self-efficacy. A negative attitude is formed as a result of the pressure associated with the task at hand in the context of IT. This argument is corroborated by the fact that CA's performance is inadequate in developing a set of negative attitude constructs and characteristics of respondents as digital natives. Thus, the ST and NA that the user may experience are indicative of stress resulting from the statistical task or the combination of functions and tasks and the utilization of the application. Users may experience stress due to the burden of preparing data, tabulating data, analyzing data, and interpreting numbers from the statistical results obtained (Nguyen et al., 2016).

CONCLUSION

The objective of this study is twofold: firstly, to examine the relationship between the set of positive attitude constructs and the set of negative attitude constructs; secondly, to identify which variables are the most dominant in the attitude construct towards statistical analysis tools. The study revealed a significant correlation between positive attitude constructs and the set of negative attitude constructs. However, the proposed variables do not generally strongly associate with the canonical variables. PU and PE were crucial predictors in the positive attitude constructs. This finding indicates that the positive attitude of users in utilizing computer-based statistical analysis tools can be formed by the availability of statistical software, which is indeed helpful in solving statistical user problems and can provide a sensation of enjoyment for users while interacting with the statistical software.

Moreover, the negative attitude construct is predicated on two key predictors: ST and NA. These factors play a pivotal role in determining the formation of a user's negative attitude in interacting with computer-based statistics. These findings indicate that negative attitudes toward computer-based statistics, tasks, software, and mixes produce psychological stress, resulting in users feeling tense and stressed. The tension and stress that users experience while using computer-based analysis tools can be triggered by the pressure of the statistical task itself or the limited ability of the software to complete specific statistical tasks. This is because software capabilities must align with the characteristics of statistical functions that users need to control, which can contribute to these negative impacts.

Theoretically, this study contributes to the body of knowledge in information systems studies, particularly in the areas of statistical analysis and the context of digital natives. The theoretical findings also have practical implications for a number of professionals, including software developers, universities, educators, and students as users. Information technology developers, particularly those specialising in statistics, can focus on enhancing the usability and appeal of existing statistical software or developing new software. While universities can adjust their investment and availability of statistical software, this refers to the key dimensions that shape attitudes towards IT. The virtue aspects can be considered indicators of usefulness and enjoyment, while the elements that need to be avoided can be viewed as indicators that can generate tension and negative affectivity. Based on this view, lecturers and students can adjust their statistical software needs for research, lectures, and learning purposes.

Although the study was conducted using a survey that supports external validity, the sample characteristics are limited, which restricts the ability to generalize the findings. To enhance the level of validation in future surveys, two key strategies can be employed. Firstly, increasing sample variation can improve generalizability. Secondly, developing experimental studies on similar topics can enhance internal validity.

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