The Effects of E-Procurement Tools on Supply Chain Performance of Procuring Entities in Tanzania: Mediation Effect of Behavioral Intention

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Abstract

The objective of this study was to look into the impact of an e-procurement tools on the supply chain performance of procuring entities in Tanzania. The study examined the direct and indirect effects of e-sourcing, e-tendering, and e-contract management on supply chain performance. The Social Information Processing theory, the Affect Infusion Model, and the original Unified Theory of Acceptance and Use of Technology guided the research. This study used an explanatory cross-sectional survey research design. The study used the positivist research paradigm, with a sample size of 322 respondents obtained through stratified sampling. Data were gathered using a questionnaire and a documentary review. Partial Squares Structural Equation Modeling with the help of SmartPLS 4 software was used for inferential statistics analysis, while IBM SPSS Statistics Version 26 was used for descriptive statistics analysis based on respondent profile data. The findings indicate that e-sourcing, e-tendering, and e-contract management have a positive direct and indirect impact on supply chain performance. The study concludes that, e-sourcing, e-tendering, and e-contracting are variables that influence supply chain performance through the behavioral intention to use e-procurement tools. According to the findings of this study, Tanzanian public procurement bodies should look into the effectiveness of e-procurement tools in ensuring effective and efficient supply chain performance.

Keywords: *Behavioral Intention; E-Contract Management; E-Procurement Tools; E-Sourcing; E-Tendering; Supply Chain Performance*

1.0 Introduction

Globally, the application of an e-procurement system to sustainable supply chain performance is primarily determined by the behavioral intention of users (in particular buyers and suppliers) to use the technology (Kariuki & Kimani, 2021; Schemm et al., 2006; Singh & Chan, 2022), and it provides several benefits to users, including lower procurement costs and improved process efficiency (Almajali et al., 2023; Ngeno & Kinoti, 2017; Oteki et al., 2018). Furthermore, perceived utility and ease of use of technology influence e-procurement adoption in supply chain management (Almajali et al., 2023). Similarly, in today's competitive corporate environment, e-procurement solutions are the foundation for supply chain performance (Almajali et al., 2023; Kariuki & Kimani 2021).

Additionally, the impact of e-procurement tools on behavior intention can be understood by combining Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), and the original Unified Theory of Acceptance and Use of Technology (UTAUT). Users' information processing strategies, which can be influenced by e-procurement tool characteristics and organizational context, can moderate the impact of affective states on behavior intention (Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Venkatesh et al., 2003). Similarly, previous research findings indicate that the use of e-procurement tools such as e-invoicing, e-tendering, and supply chain innovation improves supply chain performance in a variety of organizational contexts, including manufacturing organizations, SMEs, and public hospitals (Ibrahim et al., 2023; Wijaya, 2022; Chegugu, 2018; Polong, 2022). The studies emphasize the importance of using e-procurement practices to improve supply chain performance and organizational effectiveness (Chegugu, 2018; Polong, 2022).

However, the majority of prior empirical studies on the effects of e-procurement on supply chain performance have been insufficient in understanding the mediation effects of behavioral intention of system users (buyers and suppliers) in supply chain management (Kariuki & Kimani, 2021; Kimutai, 2016; Ngeno & Kinoti, 2017; Oteki et al., 2018; Schemm et al., 2006; Siddiqui et al., 2022; Singh & Chan, 2022). This situation creates theoretical and empirical gaps that require scientific research to be undertaken (Almajali et al., 2023; Siddiqui et al., 2022; Singh & Chan, 2022). The current study investigates the direct and indirect effects of e-procurement tools (e-sourcing, e-tendering, and e-contract management) on supply chain performance, employing Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), and the original Unified Theory of Acceptance and Use of Technology (UTAUT). Similarly, this study investigates the mediation effect of buyer and supplier behavioral intentions to use e-procurement tools to improve supply chain performance.

1.1 Constructs Development and Hypotheses Formulation

This study combined the suggestions of Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), the Unified Theory of Acceptance and Use of Technology (UTAUT), as well as the prior empirical literature review predictions and findings (Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Dobber, 1998; Chegugu, 2018; Polong, 2022; Wijaya, 2022; Ibrahim et al., 2023) to establish the research model and propose hypotheses. The SIP theory is used to investigate how people form relationships and impressions of others in computer-mediated communication (CMC) settings. It helps to explain how limited nonverbal cues affect relationship development and communication strategies in online interactions (Chaiken & Trope, 1999). In addition, SIP theory is used to investigate how affective states or moods influence judgments, decisions, and behavior in the workplace. The Affect Infusion Model (AIM) is used to study the role of affect in workplace behaviours such as motivation, creativity, performance, communication, and organizational freedom (Forgas & George, 2001). Likewise, the SIP theory is used to investigate attitude strength, specifically the concept of attitude importance. Psychology research focuses on how the personal importance of attitudes influences attitude functioning, resistance to change, information processing, memory organization, emotional reactions, and behavioral

intentions. Understanding attitude strength is critical for behavior change interventions and practical applications (Howe & Krosnick, 2017).

There are a few possible criticisms of Social Information Processing (SIP) theory: Firstly, SIP theory may simplify the complexities of social information processing. While it offers a useful framework for understanding how people form impressions and relationships in CMC settings, it may fail to capture the nuances and individual differences in how people process social information (Chaiken & Trope, 1999). Furthermore, the theory has mostly been tested in Western, educated, industrialized, wealthy, and democratic (WEIRD) societies. Therefore, its applicability to various cultural contexts is not well established. More cross-cultural research is required to determine the universality of SIP theory's principles (Chaiken and Trope, 1999). Similarly, SIP theory focuses on cognitive aspects of social information processing, but it may overlook the importance of emotions and affective states in relationship development and impression formation. Integrating insights from theories such as the Affect Infusion Model (AIM) may lead to a more comprehensive understanding of social information processing (Forgas & George, 2001). Furthermore, the theory has been criticized for its lack of specificity in predicting the exact nature of impressions and relationships that will emerge in CMC environments. While it suggests that impressions and relationships will eventually resemble face-to-face interactions, it makes no precise predictions about the specific characteristics of these interactions (Chaiken & Trope, 1999). SIP theory has been primarily used in text-based CMC environments. Its applicability to newer forms of CMC, such as video conferencing and social media, where nonverbal cues are more common, may necessitate additional research and adaptation of the theory (Chaiken & Trope, 1999).

While SIP theory provides valuable insights into social information processing in CMC environments, it is critical to acknowledge its limitations and consider integrating it with other theories to gain a more comprehensive understanding of social cognition and behavior in a variety of settings. This study combined the SIP theory with the Affect Infusion Model (AIM) to better understand the impact of e-procurement tools on supply chain performance, as mediated by buyers' and suppliers' behavioral intentions to use a new procurement system.

The Affect Infusion Model (AIM) is an information processing theory that explains how affective states or moods influence judgments, decision-making, and organizational behavior (Forgas & George, 2001). It provides a framework for understanding how emotions influence a variety of work-related behaviours, including worker motivation, creativity, performance, interpersonal judgments, communication, performance appraisal, selection interviews, organizational spontaneity, employee flexibility, helpfulness, absenteeism, bargaining, and negotiation (Forgas & George, 2001). The AIM highlights the importance of information processing strategies in moderating affective influences on organizational behavior. It suggests that affect can have a significant impact on how people perceive and respond to various workplace situations. The AIM contributes to a better understanding of the complex interplay between emotions and behavior in the workplace by incorporating affect into contemporary theorizing and research (Forgas & George, 2001). The Affect Infusion Model (AIM) has made significant contributions to our understanding of how affective states influence social judgments. However, like any theory, it has been challenged for producing inconsistent results when applied to health decisions, with some studies failing to replicate the expected mood-congruence effects (Dobber, 1998). This inconsistency calls into question the AIM's robustness in various contexts. The AIM works by inducing affective states using a variety of techniques, including audio visual and autobiographical ones. However, the effectiveness of these methods in inducing genuine emotional experiences has been called into question, which may have an impact on the findings' validity (Dobber, 1998). The AIM has primarily been tested in laboratory settings on healthy people. Its applicability to real-world situations, diverse populations, and various cultural contexts is unknown, limiting its generalizability (Dobber, 1998). The AIM may oversimplify the complex interaction of affective states and social judgments. It assumes a linear relationship between affect and judgment, which may not account for the complexities of real-world decision-making processes (Forgas, 2013; Martin & Clore, 2013). The AIM emphasizes the

cognitive aspects of affective influences. Integrating it with other theories that address the role of emotions in social judgments, such as the Social Information Processing (SIP) theory, may lead to a more comprehensive understanding of affective influences on behavior (Forgas, 2013; Martin & Clore, 2013).

The AIM's processing continuum, which predicts that more constructive judgments are more vulnerable to affective influences, may not be universally applicable. Different people or situations may experience varying levels of affect infusion, regardless of the processing strategy used (Forgas, 1995; Forgas, 1994). The AIM recognizes the importance of target, judge, and situational variables in recruiting various processing strategies. However, the precise mechanisms by which these variables influence affect infusion are unknown and require further investigation (Forgas, 1995; Forgas, 1994). In conclusion, while the Affect Infusion Model has made significant contributions to our understanding of affective influences on social judgments, it is not without limitations. Addressing these criticisms with additional research and theoretical refinements can improve the AIM's explanatory power and applicability in a variety of contexts. To address AIM's limitations, this study employed Venkatesh et al.'s (2003) original Unified Theory of Acceptance and Use of Technology (UTAUT).

Venkatesh et al. (2003) developed UTAUT after studying approximately eight theories/models (Chen et al. 2011). Venkatesh et al. (2003) investigated several theories and models, including the Diffusion of Innovation Theory (DIT), the Combined Theory of Planned Behavior/Technology Acceptance Model (TPB/TAM), the Model of PC Utilization (MPCU), the Social Cognitive Theory (SCT), the Motivational Model (MM), the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behavior. Venkatesh et al. (2003) discovered that the eight theories/models could only account for 17-53% of the variation in users' propensity to adopt information technologies (IT). However, using the same data, Venkatesh et al. (2003)'s origin UTAUT outperformed all eight theories/models, with the theory explaining nearly 70% of the variation in behavioral intention to use information technologies (IT) (Dwivedi et al., 2017). The original UTAUT was used in this study because it was more effective at describing the variation in users' intentions to use information technologies (IT).

Despite the initial UTAUT's ability to predict approximately 70% of variation in behavioral intention to use information technology (IT), a number of authors have actively challenged it in recent years. Dwivedi et al. (2017), for example, argue that moderators like gender, age, experience, and voluntariness have no effect on the linkages between constructs and use behavior. This argument was supported by a number of previous empirical studies that removed the four moderators proposed by Venkatesh et al. (2003) and added new dimensions such as attitude (Dwivedi et al., 2017; Venkatesh et al., 2016; Venkatesh et al., 2012). Based on the criticisms smoothed at previous research by Venkatesh et al. (2012), Venkatesh et al. (2016), and Dwivedi et al. (2017), this study contends that e-procurement tools (e-sourcing, e-tendering, and e-contract management) would positively and directly influence behavioral intention. Furthermore, these tools will have an impact on supply chain performance, both directly and indirectly. The relationships between e-procurement tools (e-sourcing, e-tendering, and e-contract management) and behavioral intention to use the tools were anticipated as a novel theoretical addition because they are currently unexplored in existing theories and models. Furthermore, because the original and modified UTAUTs do not account for this type of linkage (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016), the relationship between behavioral intention to use the tools and supply chain performance was thought to be a novel theoretical contribution. Similarly, existing empirical research does not provide adequate explanations for these types of relationships (Kariuki & Kimani, 2021; Kimutai, 2016; Ngeno & Kinoti, 2017; Oteki et al., 2018; Schemm et al., 2006; Siddiqui et al., 2022; Singh & Chan, 2022).

1.1.1 The Effect of e-Procurement Tools on Behavior Intention

The impact of e-procurement tools (e-sourcing, e-tendering, and e-contract management) on behavior intention can be examined through the lens of Social Information Processing (SIP) theory and the Affect Infusion Model (AIM). According to SIP theory, the absence of nonverbal cues in computer-mediated communication (CMC) environments, such as e-procurement platforms, can initially slow the development of impressions and relationships when compared to face-to-face interactions (Forgas and George, 2001). As people exchange more verbal and textual cues, their communication strategies adapt to the medium, forming impressions and relationships similar to face-to-face interactions (Forgas & George, 2001).

In the context of e-procurement, the use of e-procurement tools can influence behavior intention via the information processing strategies used by users, specifically buyers and suppliers. The Affect Infusion Model (AIM) proposes that affective states or moods can influence judgments, decisions, and behavior in a variety of contexts, including organizational settings (Forgas & George, 2001; Forgas, 1994). According to the AIM, the degree of affect infusion into judgments varies along a processing continuum, with more constructive judgments (heuristic and substantive strategies) being more susceptible to affective influences than simple, reconstructive judgments (direct access and motivated processing) (Forgas, 1995).

In the case of e-procurement, the complexity of the task and the processing strategy used by users can help to mitigate the impact of affective states on behavior intention. For example, if users find e-procurement tools to be user-friendly and intuitive, they may rely on heuristic processing strategies, potentially leading to a stronger influence of affective states on behavior intention (Forgas, 1995; Dobber, 1998). On the other hand, if users perceive e-procurement tools to be complex and require more substantive processing, affective states may have less influence on their behavior intentions. Furthermore, target, judge, and situational variables can help recruit different processing strategies and moderate the impact of e-procurement tools on behavior intention (Forgas, 1995; Dobber, 1998). For example, the perceived usefulness and ease of use of e-procurement tools, as well as organizational culture and support for e-procurement, can all influence users' processing strategies and, as a result, their behavior intention (Dobber, 1998). Based on the findings of Social Information Processing (SIP) theory and the Affect Infusion Model (AIM), this study hypothesized that e-procurement tools (e-sourcing, e-tendering, and e-contract management) would improve buyers' and suppliers' behavioral intentions to use e-procurement systems to improve supply chain performance. This is because the existing empirical literature focused less on this relationship. They predicted only the effects of attitude, performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioral intention, and the results showed positive path coefficients and statistically significant relationships (Dwivedi et al., 2017; Shatta, 2023; Venkatesh et al., 2012; Venkatesh et al., 2016; Eugenie & De Dieu, 2022).

H$_{1:}$ e-Sourcing (eS) positively influences behavioral intention

H$_{2:}$ e-Tendering (eT) positively influences behavioral intention

H$_{3:}$ e-Contract Management positively influences behavioral intention

1.1.2 The Effect of Behavioral Intention on Supply Chain Performance

Many empirical studies have tested the effect of behavioral intention on various forms of performance (Waithaka & Kimani, 2021b; Ndei & Mutuku, 2021; Ratnawati & Suryawan, 2021; Esimit & Kibet, 2021; Willy & Paul, 2021; Yuliawati & Kurniawan, 2021; Masudin et al., 2021; Waithaka & Kimani, 2021a), and the results have been positive. Furthermore, Behavioral Intention (BI) improves supply chain performance. Research findings support this relationship, indicating that behavioral intention has a significant impact on various aspects of supply chain management. According to studies,

performance expectancy, effort expectancy, facilitating conditions, technology readiness, and social influence all play important roles in shaping behavioral intention to adopt innovative technologies such as blockchain and mobile devices in supply chain operations (Zhang et al., 2023; Nguyen & Nguyen, 2021; Schoenherr, 2016; Blay, 2022). These factors help to improve supply chain performance measures such as delivery, flexibility, quality, cost, and innovation, resulting in increased competitiveness and operational efficiency (Schoenherr, 2016). The empirical evidence suggests that a positive behavioral intention to adopt new technologies can have a direct and indirect positive impact on supply chain performance, emphasizing the importance of understanding and fostering behavioral intention in supply chain management contexts. In this study, behavioral intention is defined as a person's willingness to use e-procurement tools, which is expected to influence supply chain performance.

H_4: Behavioral Intention (BI) directly and positively influences supply chain performance

1.1.3 The Effect of e-Procurement Tools on Supply Chain Performance

Several research articles have looked into the impact of e-procurement tools on supply chain performance. For example, Ibrahim et al. (2023) investigated the effects of e-procurement on supply chain performance and innovation in Indonesian manufacturing organizations. The results showed that implementing e-procurement had a positive and significant impact on supply chain performance. Furthermore, e-procurement had a positive and significant impact on supply chain innovation, which in turn improved supply chain performance. According to Ibrahim et al. (2023), supply chain innovation plays a mediating role in the relationship between e-procurement and supply chain performance.

Another study conducted by Wijaya (2022) examined the impact of e-procurement and supply chain innovation on the performance of Small and Medium Enterprises (SMEs). The findings revealed that implementing e-procurement had a significant impact on supply chain efficiency. Similarly, supply chain innovation was discovered to have a significant impact on small and medium-sized enterprises' supply chains. This study emphasized the importance of e-procurement and supply chain innovation in improving SMEs' performance in Indonesia (Wijaya, 2022). Similarly, two studies conducted in public hospitals looked at the impact of e-invoicing and e-tendering on organizational performance. The findings revealed that e-invoicing and e-tendering practices had a positive impact on organizational performance, increasing tendering bid competitiveness and improving overall hospital performance. These studies emphasized the importance of e-procurement practices, such as e-invoicing and e-tendering, in improving healthcare organization performance (Chegugu, 2018; Polong, 2022).

However, these studies did not consider the impact of e-sourcing and e-contract management, as well as the mediation effect of users' behavioral intentions on organizational performance. Furthermore, understanding the mediation effects of behavioral intention on supply chain performance was critical in this study because the Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), the original UTAUT by Venkatesh et al. (2003), and their modified versions by previous research (Venkatesh et al. 2016 & Dwivedi et al. 2017) do not adequately explain the mediation effects of behavioral intention to use e-procurement tools on supply chain performance. Prior theoretical and empirical literature does not address the indirect effects of e-sourcing, e-tendering, and e-contract management through behavioral intention. As a result, the objective of this study was to show the mediation effects of behavioral intention to use e-procurement tools as a primary predictor of theoretical and empirical knowledge contribution.

*H_1*H_4: Behavioral Intention (BI) mediates positively the influence of e-sourcing on supply chain performance (SCP)*

*H_2*H_4: Behavioral Intention (BI) mediates positively the influence of e-Tendering (eT) on supply chain performance (SCP)*

*H₃*H₄: Behavioral Intention (BI) mediates positively the influence of e-Contract Management (eCM) on supply chain performance (SCP)*

1.1.4 Conceptual Model of the Study

The conceptual model of this study was developed by combining insights from previous empirical research with the theoretical underpinnings of the study, which are based on the Social Information Processing (SIP) theory, the Affect Infusion Model (AIM) and original Unified Theory of Acceptance and Use of Technology (UTAUT). Figure 1 illustrates the study's conceptual model.

Key

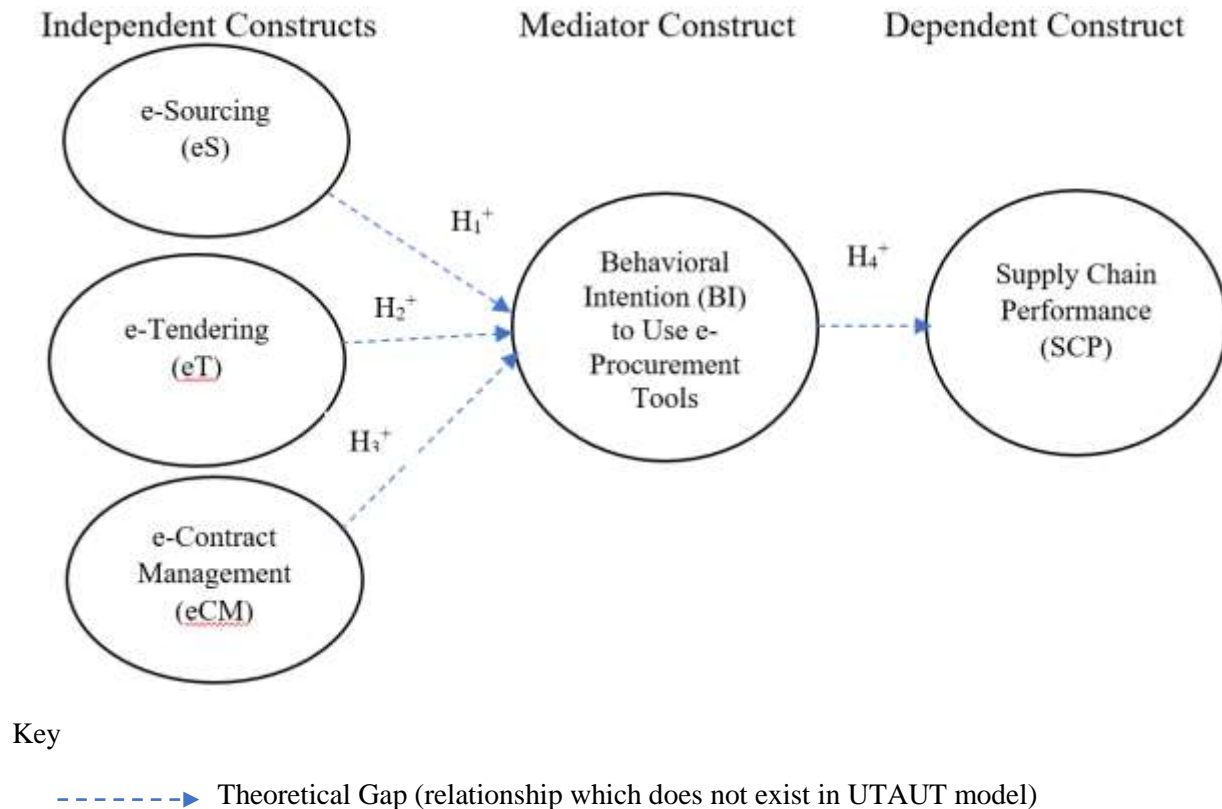- - - - - - -► Theoretical Gap (relationship which does not exist in UTAUT model)

Figure 1: Conceptual Model of the Study
Source: Conceptualized from Literature Review (2024)

1.1.5 The Mathematical Model for Latent Variable and its Observed Indicators

The mathematical model $x=lY+e$ was used in this work to show the relationship between a latent variable and its observable indicators, as shown in Figure 1 and Figure 2. (Shatta & Mabina, 2024). According to Sarstedt et al. (2022) and Shatta (2023) define x as the observable indicator variable, Y as the latent variable, l as a regression coefficient indicating the strength of the link between x and Y, and e as the random measurement error.

2.0 Materials and Methods

In this study, the hypotheses were examined using both positivist and deductive approaches. Similarly, an explanatory cross-sectional research methodology was employed because data were collected only once from a specific group by analyzing a subset of that population (Creswell & Plano, 2018). Furthermore, this study collected data using a survey approach, which allows for the collection of

quantitative data and its statistical evaluation using descriptive and inferential statistics. Data collection entailed sending a questionnaire link to buyers' and suppliers' WhatsApp groups as well as their email addresses. Between October and November 2023, respondents completed the survey using a Google Form. This study used a survey questionnaire that included two parts: demographic factors (respondent type and education level) and latent constructs (e-sourcing, e-tendering, e-contract management, behavioral intentions and supply chain performance). The stratified sampling technique was used to test the study's hypotheses, and the tenth rule of thumb proposed by Hair et al. (2019) for using PLS-SEM and SmartPLS software in data analysis was used to justify the minimum number of respondents needed to test the proposed research model. Hair et al. (2019) proposed the tenth rule of thumb, which states that the number of exogenous construct indicators (i.e. five (5) indicators of e-tendering, which is an exogenous construct in this study as presented in Figure 2) multiplied by ten equals the minimum sample size required to test the hypotheses of the proposed research model. According to the tenth rule of thumb, a sample of 322 respondents was sufficient to test the hypotheses of this study because it exceeded the required minimum sample size of respondents. Furthermore, surveys with closed-ended questions were assigned numbers to simplify and improve the accuracy of quantitative data analysis. The quantitative data collected for the respondents' profiles was analyzed with descriptive statistics and IBM SPSS Statistics Software Version 26. For inferential statistical analysis, SmartPLS 4 software was used to perform partial least squares structural equation modeling (PLS-SEM). To deal with missing values, SmartPLS 4 software used the extra response approach. In this study, 99 was used as an additional response to replace seventeen (17) missing answers from the questionnaires. This strategy, on the other hand, enables systematic differentiation of observed and unobserved data (Hair et al., 2019). Outliers were identified using IBM SPSS Statistics version 26 by comparing the frequencies of all variables to their degree of agreement. However, no outliers were discovered in this study.

2.1 Evaluation of Models

The criteria specified by Hair et al. (2019) were employed in this study to assess the measurement model and structural model of the proposed research model. The four processes involved in evaluating the reflective measurement models were as follows: The reliability value of the indicators should be >0.708, the internal consistent reliability value of the composite reliability of constructs should be >0.708, the convergent validity of the constructs should be > 0.5, and the discriminant validity Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion value should be 0.9. Similarly, collinearity for structural model constructs was investigated. Collinearity difficulties may emerge at lower VIF values of 3 to 5, according to Hair et al. (2019). VIF values over 5 are indicative of potential collinearity among the predictor constructions concerns, although collinearity problems can exist at lower VIF values of 3 to 5. VIF levels should ideally be close to 3 or below.

The essential criteria for validating the structural model in PLS-SEM after screening for collinearity were: the significance of the path coefficients, t-statistic more than 1.96 at significance level of 0.05 for all pathways is acceptable, and p values of 0.05 or less are considered significant. R^2 values of 0.75, 0.50, and 0.25 are deemed significant, moderate, and weak, respectively (Hair et al., 2019). Values greater than 0.02, 0.15, and 0.35 represent modest, medium, and large f^2 impact sizes, respectively (Hair et al., 2019). Similarly, Becker et al. (2018) recommend that the predictive relevance (Q^2 effect size) be smaller than zero. In general, the assessment of the measurement and structural models produced excellent findings that satisfied all of the criteria specified by Hair et al. (2019) in applying PLS SEM with the help of SmartPLS 4 software.

3.0 Results

3.1 Characteristics of the Respondents

This study included buyers from procuring entities as well as registered suppliers who use an e-procurement system when tendering and providing products to procuring entities. Approximately 66 percent of respondents were suppliers, with approximately 34 percent being buyers. These findings contradict Shatta's (2020) findings, which revealed that two-thirds of respondents were government buyers and one-third were private-sector suppliers. As a result, in studies involving buyers from public institutions and suppliers from the private sector, suppliers' response rates are not always lower. Furthermore, approximately 54% of those polled held a bachelor's degree or higher. These findings are similar to those of previous research by San et al. (2020). The study by San et al. (2020) revealed that majority of study participants held a bachelor's degree. These findings indicate that the information provided by the current study's respondents is correct. Table 1 displays the various types of respondents and their educational levels.

Table 1: Types of Respondents and Their Education Levels

		Education Level						
		Primary Education	Secondary Education	Certificate Level	Diploma Level	Bachelor Degree	Masters	PhD	Total
Type of Respondent	Buyers	0	0	0	10	64	34	2	110
	Suppliers	1	12	18	50	110	21	0	212
	Total	1	12	18	60	174	55	2	322

3.2 Indicator's Reliabilities, R^2 Values and Relevance of the Path Coefficients

Figure 2 demonstrates that, with the exception of eT2, all construct indicators' loadings were more than 0.7, as indicated by Hair et al. (2019). According to Hair et al. (2019), an indicator's reliability with less value of 0.7 might be well-considered for removal only if removing this indication would have a favorable influence on the composite reliability (CR) and Average Variance Extracted (AVE). Based on this fact, eT2 was not eliminated since it had no effect on the internal consistent reliability (CR) values of all constructs, which were >0.7, and the Average Variance Extracted (AVE) values of all constructs, which were >0.5. With these findings, each construct explained more than half of the variation in the indicator, indicating good item reliability (Hair et al., 2019). Furthermore, Figure 2 shows that the R^2 values were 0.544 and 0.607, respectively. These findings indicated that the exogenous components (e-sourcing (eS), e-tendering (eT), and e-contract management (eCM) affected about 54% of the variance in behavioral intention (BI) to employ e-procurement tools. Additionally, the exogenous constructs (e-sourcing (eS), e-tendering (eT), and e-contract management (eCM)) coupled with the mediator behavioral intention (BI) controlled around 61 percent of the variance in supply chain performance (SCP). Furthermore, all hypothesized relationships had positive path coefficients, implying that an increase in one standard deviation of the exogenous constructs (e-sourcing (eS), e-tendering (eT), and e-contract management (eCM)) in conjunction with the mediator behavioral intention (BI) translated into an increase in the rate of change of the mindset of buyers and suppliers and, as a result, an increase in supply chain performance.
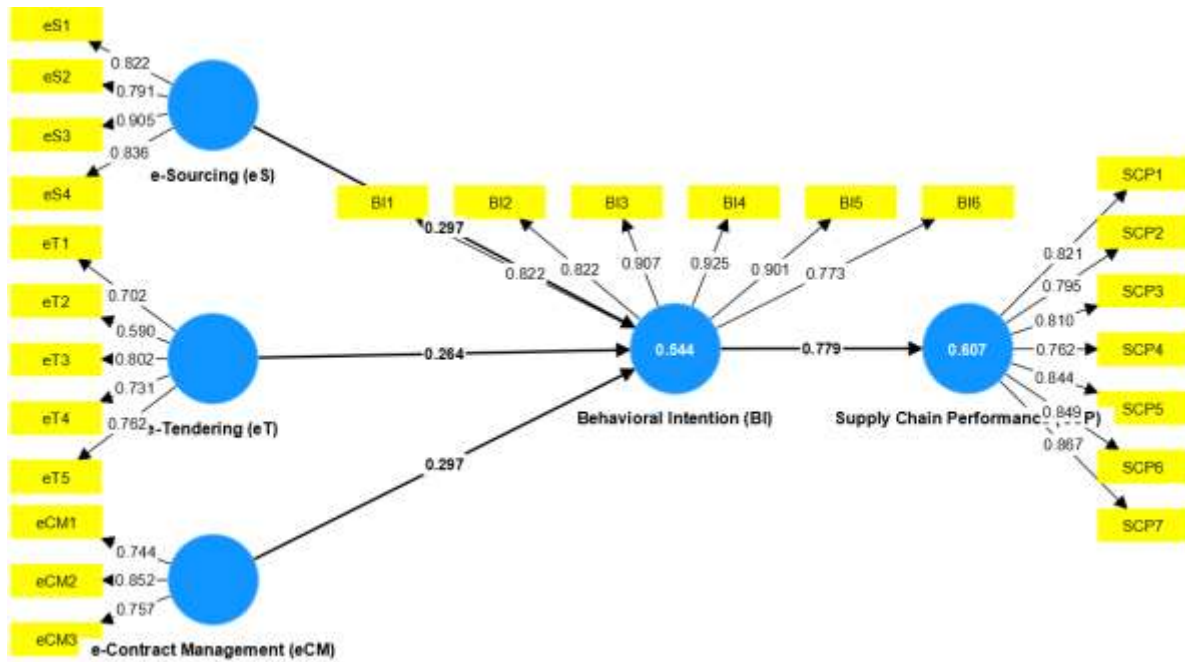
Figure 2: Indicators' Reliabilities, R^2 Values and Relevance of the Path Coefficients of the Model

3.3 Reliability and Convergent Validity Analysis Results

The composite reliability (CR) and average variance extracted (AVE) of all constructs in the study model met the Hair et al. (2019) criterion value. These findings imply that there were desired response patterns, and that each construct converged to explain the variance of its item (Hair et al., 2019). Table 2 shows the findings for the constructs' reliability and convergent validity.

Table 2: Reliability and Convergent Validity Analysis Results

	Composite Reliability (CR)	Average Variance Extracted (AVE)
Behavioral Intention (BI)	0.944	0.740
Supply Chain Performance (SCP)	0.936	0.675
e-Contract Management (eCM)	0.828	0.617
e-Sourcing (eS)	0.905	0.704
e-Tendering (eT)	0.848	0.583

3.4 Discriminant Validity Analysis (HTMT Results)

Table 3 depicts the relationships between constructs in the research model that have HTMT values less than 0.90. The findings support Hair et al.'s (2019) suggestion that each exogenous construct in the research framework had a distinct effect on the endogenous construct.

Table 3: Discriminant Validity Analysis (HTMT Results)

Construct	BI	SCP	eCM	eS	eT
BI	0.860				
SCP	0.779	0.822			
eCM	0.649	0.576	0.786		
eS	0.609	0.508	0.545	0.839	
eT	0.645	0.636	0.734	0.565	0.763

3.5 Collinearity Statistics by VIF Metric for Inner Model

The Variance Inflation Factor (VIF) was used to determine collinearity in the data. However, Hair et al. (2019) discovered that VIF values less than 3 indicate that the predictor constructs of the proposed research model are not collinear. Table 4 shows statistical data on collinearity in the inner model of the proposed study model. The VIF measure was used, and values less than 3 were discovered, indicating that there were no issues with collinearity in the predictor constructs of the proposed research model.

Table 4: Collinearity Statistics (VIF) for Inner Model Results

	BI	SCP
BI		1.000
eCM	2.288	
eS	1.553	
eT	2.366	

3.6 F^2 Values Results

Hair et al. (2019) observed that impact sizes of 0.02, 0.15, and 0.35 resulted in small, medium, and high f² values. Table 5 displays the effect sizes (f²) for four distinct relationships: 0.061, 0.083, 0.129, and 1.543. These values indicate the existence of small, medium, and large impact sizes for all hypotheses in the research model.

Table 5: F^2 Values Results

	BI	SCP
BI		1.543
eCM	0.083	
eS	0.129	
eT	0.061	

3.7 Q^2 Predict Results

The current study discovered that the Q^2 values for all endogenous constructs, specifically behavioral intentions (BI) and supply chain performance (SCP), were greater than zero. This indicates that the exogenous variables e-sourcing (eS), e-tendering (eT), and e-contract management (eCM) have predictive power in the research model. Table 6 displays the Q^2 findings for the endogenous construct in the proposed research model.

Table 6: Q^2 Predict Results

	Q²predict	RMSE	MAE
BI	0.527	0.699	0.480
SCP	0.420	0.770	0.584

3.8 Statistical Significance of the Tested Relationships

Figure 3 illustrates that all predicted associations were accepted (all p values were less than 0.05), implying that this study's theoretical research model may be applied in decision making. This is because all theorized connections seem to occur in actual life.
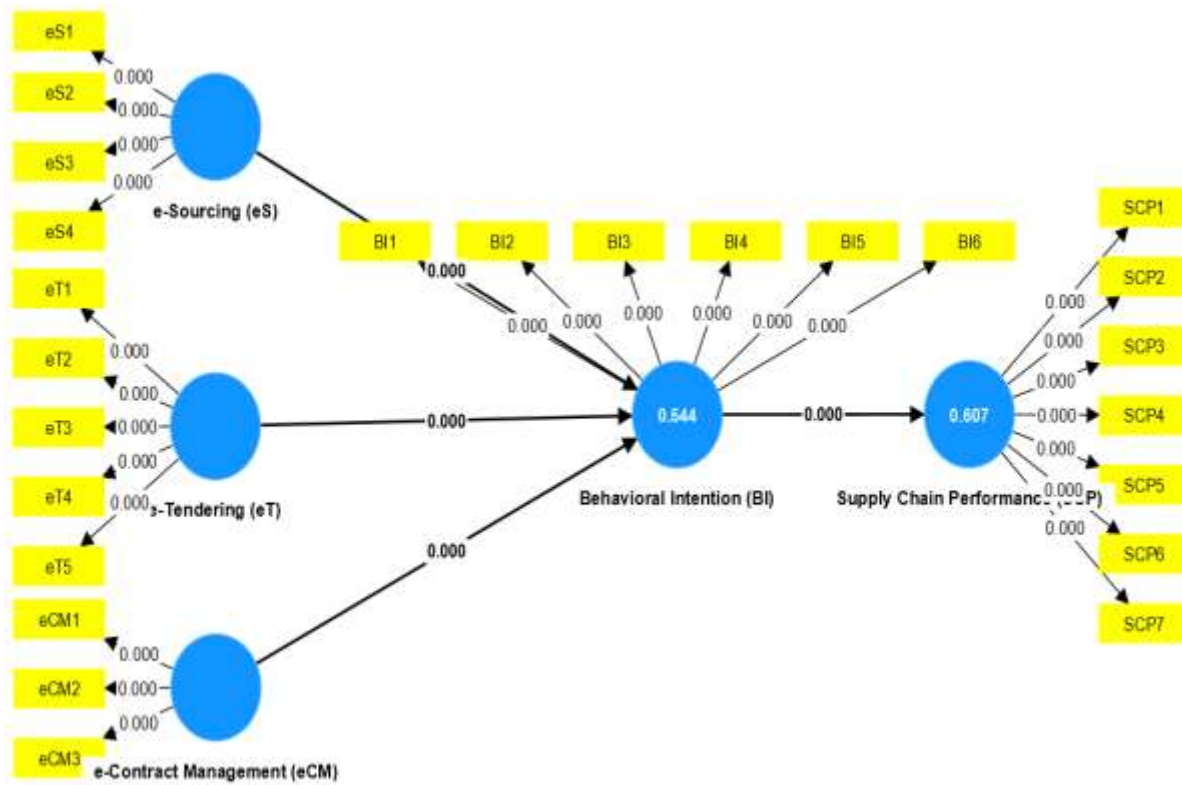

Figure 3: Statistical Significance Results of the Tested Hypotheses

3.9 Indirect Statistical Significance Results of the Hypotheses

Table 7 summarizes the results of the indirect assumption assessment using the study's theoretical framework. The bootstrapping report created with SmartPLS 4 software showed statistically significant results for indirect predictions (p-values <0.05). This implies that the model's connections exist in real-world situations, and the validated model has the potential to be effectively applied to decision-making processes related to the determinants of supply chain performance.

Table 7: Indirect Statistical Significance Results of the Hypotheses

	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
eT -> BI -> SCP	0.047	4.252	0.000
eS -> BI -> SCP	0.060	3.948	0.000
eCM -> BI -> SCP	0.050	4.605	0.000

3.10 Direct and Indirect Statistical Significance Results of the Hypotheses

Table 8 summarizes the findings from evaluating direct and indirect assumptions using the research's theoretical model. The bootstrapping report using SmartPLS 4 software produced statistically significant results for both direct and indirect predictions (p-value < 0.05). This demonstrates that the model's identified relationships exist in real-world situations, and that the validated model can be used to make decisions successfully related to the effects of e-procurement tools on supply chain performance mediated by behavioral intentions of buyers and suppliers to use e-procurement system in supply chain management.

Table 8: Total Effects of Statistical Significance Results of the Hypotheses

	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
BI -> SCP	0.033	23.702	0.000
eCM -> BI	0.065	4.514	0.000
eCM -> SCP	0.050	4.605	0.000
eS -> BI	0.071	4.280	0.000
eS -> SCP	0.060	3.948	0.000
eT -> BI	0.061	4.233	0.000
eT -> SCP	0.047	4.252	0.000

3.11 Importance-Performance Map Analysis Results

Figure 4 shows that the construct behavioral intention is positioned above the average of the importance and performance of the target construct supply chain performance, indicating that this construct should be prioritized first and more heavily invested in during the implementation of e-procurement tools for improved supply chain performance. The constructs e-sourcing (eS), e-tendering (eT), and e-contract management (eCM), on the other hand, are positioned below the average of the importance of the target construct' supply chain performance,' implying that these constructs have a low impact on the target construct. However, these constructs are positioned above the average of target construct supply chain performance, suggesting that they should be given second priority during e-procurement tool deployment for improved supply chain performance.
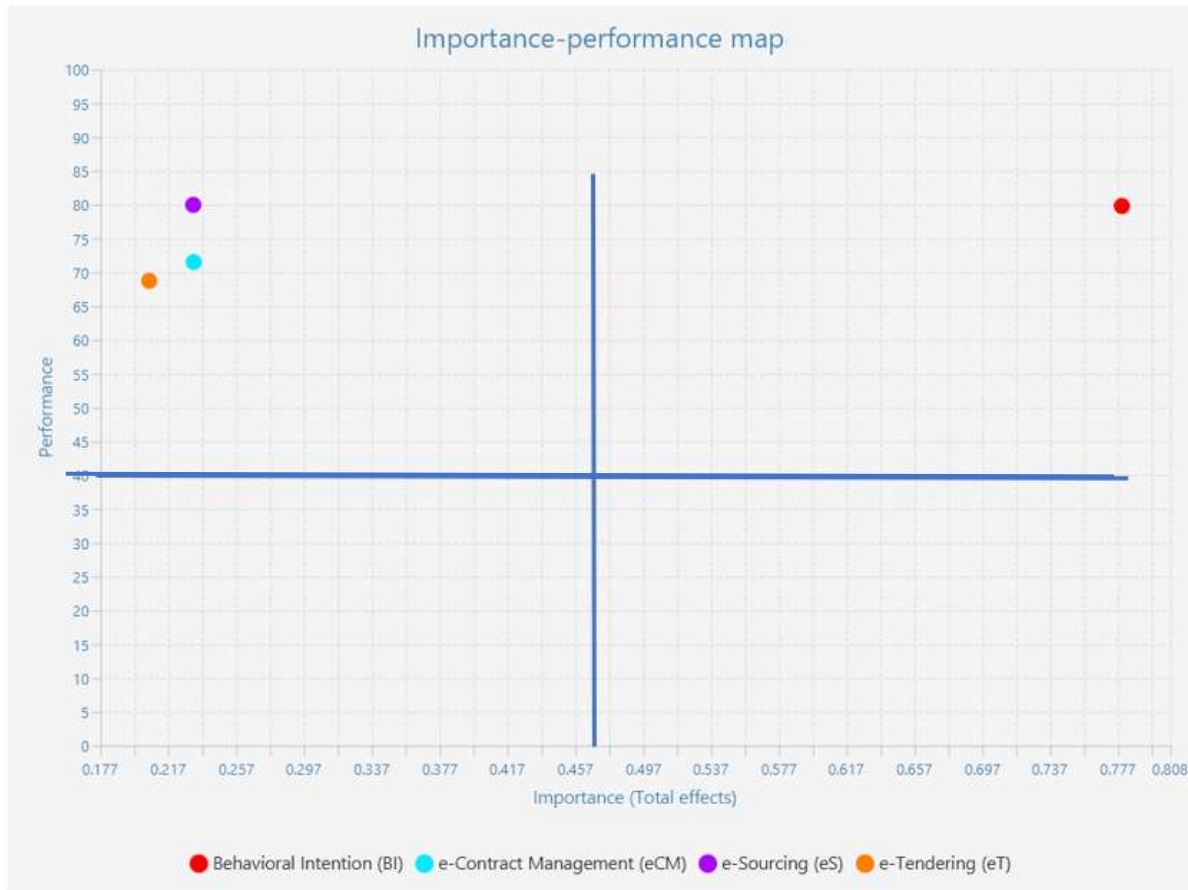
Figure 4: Importance-Performance Map Analysis Results

3.12 Additional Analysis for Testing the Types of Mediation Exist in the Proposed Model

The forms of mediation found in the predicted research model were evaluated. Full mediation happens when the direct impact is not statistically significant but the indirect effect is, according to Hair et al. (2019), whereas partial mediation occurs when both the indirect and direct effects are statistically significant. Based on this fact, further study was carried out in order to comprehend the types of mediation effects that exist in the predicted research model. The theoretical model now includes direct impacts of e-sourcing (eS), e-tendering (eT), and e-contract management (eCM) on supply chain performance. Following the bootstrapping process, it was discovered that the direct effects of e-sourcing (eS) and e-contract management (eCM) on supply chain performance were statistically insignificant (p value > 0.05), whereas their indirect effects were statistically significant (p value < 0.05), indicating that full mediation exists (Hair et al., 2019). However, both the direct and indirect impacts of e-tendering (eT) on supply chain performance were found to be statistically significant (p value < 0.05), indicating the existence of partial mediation. Based on the results of the further investigation, it is determined that partial and full mediation effects exist in the proposed research model. Figure 5 depicts the outcomes of evaluating the various forms of mediation that exist in the suggested study paradigm.
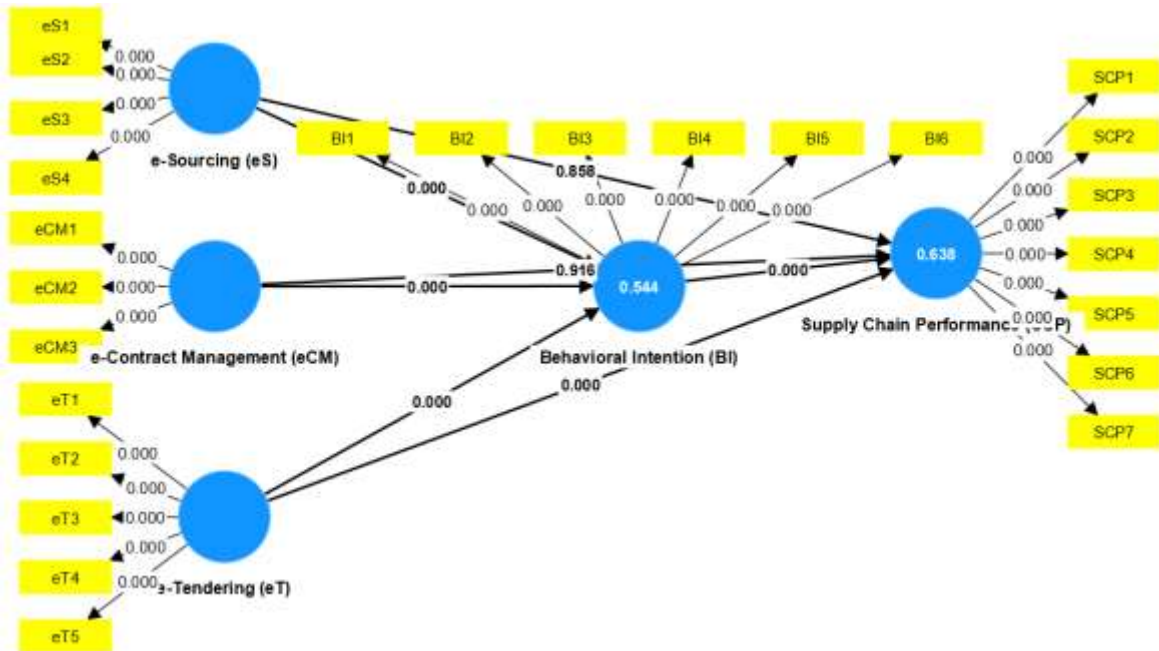
Figure 5: Results for testing the types of mediation exist in the proposed research model

4.0 Discussion

4.1 Hypotheses Tested

The findings of this study indicate that e-sourcing (eS), e-tendering (eT), and e-contract management (eCM) have a positive and direct impact on behavioral intentions to use e-procurement tools. The results depicted in Figure 2 indicate the presence of positive path coefficients and significant correlations in real-world scenarios, as evidenced by the statistically significant associations (p value < 0.05) presented in Figure 3 and Table 8. The results of previous studies (Forgas & George, 2001; Forgas, 1994; Dobber, 1998) are consistent with these findings. These studies showed that when users perceive e-procurement tools as user-friendly and intuitive, they are more likely to rely on empirical processing strategies. This, in turn, can result in a greater impact of emotional states on behavioral intention. However, these findings contradict previous research that only anticipated the impacts of attitude, performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioral intention (Dwivedi et al., 2017; Shatta, 2023; Shatta & Mabina, 2024; Venkatesh et al., 2012; Venkatesh et al., 2016; Eugenie & De Dieu, 2022).

Moreover, this study postulated that behavioral intention would have a direct and positive impact on supply chain performance. Figure 2 demonstrates that there are positive path coefficients. This indicates that there is a tangible connection in the real world, as the association has been established to be statistically significant (p value < 0.05), as demonstrated in Table 8. The results align with previous studies (Zhang et al., 2023; Nguyen & Nguyen, 2021; Schoenherr, 2016; Blay, 2022), indicating that a favourable feeling to embrace new technologies can directly and indirectly enhance the performance of the supply chain.

This study also proposed that e-sourcing (eS), e-tendering (eT), and e-contract management (eCM) would have a positive mediating effect on the behavioral intention to use e-procurement tools, which in turn would influence the performance of the supply chain. Figure 2 displays the presence of positive path coefficients. Therefore, the presence of a link in real life can be inferred from the

statistically significant associations presented in Table 8 (p value < 0.05). The findings of this study are inconsistent with previous research conducted by Chegugu (2018), Polong (2022), Wijaya (2022), Ibrahim et al. (2023), Venkatesh et al. (2016), Dwivedi et al. (2017), Venkatesh et al. (2003), Forgas & George (2001), Forgas (1994), and Dobber (1998). These earlier studies did not consider the indirect effects of e-sourcing, e-tendering, and e-contract management on supply chain performance through behavioral intention. Therefore, the predicted correlations' outcomes are regarded as theoretical and empirical knowledge additions due to the current literature's inability to fully comprehend this type of phenomenon.

5.0 Conclusion

5.1 Theoretical Implications

The validated theoretical model depicted in Figure 5 and the findings presented in Table 7 and Table 8 have successfully addressed the identified theoretical gap, resulting in a significant theoretical contribution to existing theories and models. The existing theoretical and empirical literature lacked a comprehensive understanding and validation of the interactions between e-procurement tools, behavioral intention as a mediator, and supply chain performance as a dependent construct. Figure 6 displays the ultimate verified research model.
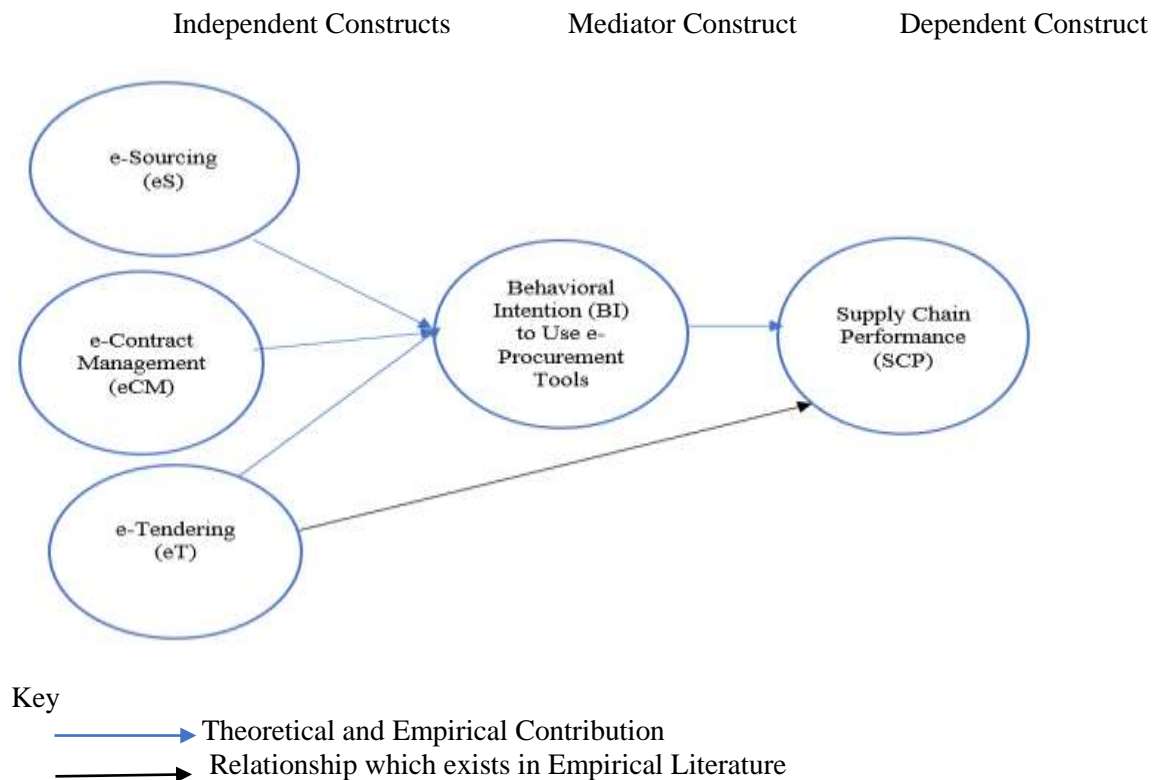

Figure 6: Validated model
Source: Authors, (2024)

5.2 Practical Implications

Based on the validated study model presented in Figure 6, it has been determined that changing the attitude of buyers and suppliers towards the adoption of e-procurement tools has the most significant

impact on enhancing supply chain performance. This is achieved through the mediation of behavioral intention. The statistical significance of e-tendering for both direct and indirect impacts on supply chain performance indicates that buyers and suppliers base their decisions on the utilization of e-procurement systems in supply chain management solely on the advantages of e-tendering. The statistical analysis shows that e-sourcing (eS) and e-contract management (eCM) have a significant impact on supply chain performance, but only indirectly. This means that buyers and suppliers do not directly depend on the benefits of e-sourcing (eS) and e-contract management (eCM) when deciding to use e-procurement systems in supply chain management. However, the benefits of e-sourcing (eS) and e-contract management (eCM) can indirectly influence their mindset and encourage the implementation of e-procurement systems in supply chain management.

5.3 Managerial Implications

Figure 4 demonstrates the significance of the theoretical research model in decision-making, particularly in organizing crucial investment structures for the implementation of e-procurement tools. This implementation aims to enhance supply chain performance in a specific business.

5.4 Limitations and Suggestions for Future Research

This study applied four components derived from two theories and one model, which accounted for approximately 64% of the variation in supply chain performance. Consequently, the study recommends that future research should investigate other factors from the current body of literature in order to improve the range of supply chain performance from a moderate level (63.9%) as presented in Figure 5 to a significant level. According to Hair et al. (2019), R^2 values of 0.75, 0.50, and 0.25 are considered significant, moderate, and weak, respectively. Similarly, this study depended on respondents from a solitary country, Tanzania. Therefore, this study recommends that future research incorporate suppliers and buyers from different countries in order to generalize the validated research model presented in Figure 6.

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Appendix A: Variables, Indicators, Measurement, Analysis Method and Tool

Dependent Variable	Indicators	Level of Measurement	Analysis Method	Analysis Tool
Supply Chain Performance	Quality of goods/works/services, transparency, economy, efficiency, effectiveness and satisfaction	Ordinal	PLS-SEM	SmartPLS 4
Mediator Variable	**Indicators**	**Measurement Level**	**Analysis Method**	**Analysis Tool**
Behavioral Intention	Personal opinion on e-Procurement tools, intention to learn the tools, intention to use the tools, intention to take advantages of the tools	Ordinal	PLS-SEM	SmartPLS 4
Independent Variables	**Indicators**	**Measurement Level**	**Analysis Method**	**Analysis Tool**
e-Sourcing	Defining requirements, Category strategy / analysis, Supplier identification/ selection	Ordinal	PLS-SEM	SmartPLS 4
e-Tendering	registration, tender submission, tender evaluation and tender award	Ordinal	PLS-SEM	SmartPLS 4
e-Contract management	monitoring, controlling, managing activities and obligations	Ordinal	PLS-SEM	SmartPLS 4