The determinants of use behavior of e-procurement system in developing countries: a mediating effect of buyers’ and suppliers’ attitude from Tanzania

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A B S T R A C T

The existing body of literature on e-procurement adoption has not adequately predicted the direct and indirect impact of performance expectancy and effort expectancy on the usage behavior of e-procurement system in Tanzania. The paper was guided by the Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), and the modified Unified Theory of Acceptance and Use of Technology (UTAUT). The paper also used a deductive perspective and an explanatory cross-sectional research approach. A stratified sampling technique was used to identify 383 respondents (buyers and suppliers) that use the e-procurement system. Data gathering was conducted via the use of a documentary review and questionnaire. Inferential statistical analysis was conducted using the Partial Least Squares Structural Equation Modeling, with the assistance of SmartPLS 4 software. The results indicate that performance expectancy, effort expectancy, and attitude significantly influence positively the usage behavior of the e-procurement system (p value < 0.05). The paper finds that the behavior of buyers and suppliers, after the adoption of an e-procurement system, is indirectly impacted by the system’s performance expectancy and effort expectancy, via their positive attitudes. The results of this study confirm the usefulness of the proposed research model in directing management decision-making, particularly in determining the importance of investment considerations when implementing or improving an e-procurement system.

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Introduction

The perception of users towards any technology on a global rule is shaped by their expectations of performance and the effort required to utilize them (Venkatesh et al., 2003; Dwivedi et al., 2017). Nevertheless, the feeling to use the technologies is favorably impacted by users’ positive attitude, social influence, facilitating conditions, performance expectancy, and effort expectancy towards usage behavior (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016). However, when it comes to procurement, some buyers and suppliers in developing countries, Tanzania in particular still have a negative view regarding the implementation of e-procurement system (URT, 2018; Shilla, 2019).

It is crucial to comprehend the mediation effects of attitude on the use behavior of buyers and suppliers because the existing body of literature on e-procurement adoption (Almajali, 2023; Elias, 2021; Hareliman, 2018; Shahn et al., 2022; Eugenie & De Dieu, 2022; Gambo et al., 2019; Giri et al., 2023; Matano et al., 2020; San et al., 2020; Singh & Chan, 2022; Elias, 2018; Waithaka & Kimani, 2021b; Ndei & Mutuku, 2021; Kariuki & Kimani, 2021; Ratnawati & Suryawan, 2021; Esimit & Kibet, 2021; Willy & Paul, 2021; Yuliawati & Kurniawan, 2021; Masudin et al., 2021; Alehegn, 2019; Siwandeti et al., 2021b; Siddiqui et al., 2022) has not adequately predicted the indirect impact of performance expectancy and effort expectancy on the usage behavior of e-procurement system through the attitude of users. Likewise, the current models and theories on technology adoption have failed to sufficiently account...
for the direct relationship between attitude and usage behavior of new technologies (Chen et al., 2011; Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Dobber, 1998; Chegugu, 2018; Polong, 2022; Wijaya, 2022; Ibrahim et al., 2023; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016).

The purpose of this study is to validate, a matter that has grown little attention in earlier empirical and theoretical literature, that attitudes, performance expectancy, and effort expectancy directly and indirectly affect the usage of e-procurement system. In addition, this work extends the revised Unified Theory of Acceptance and Use of Technology (UTAUT) put out by Dwivedi et al. (2017), Social Information Processing (SIP) theory, the Affect Infusion Model (AIM). This is due to the fact that mediation effects of buyers and suppliers are important for enhancing current theories and models as they offer insights into the underlying mechanisms through which variables influence one another (Emsley et al., 2010). By identifying and measuring these indirect and direct impacts, it can improve comprehension of complicated connections and enhance existing theoretical models (McLaron & O’Neill, 2018).

This paper is structured as follows: after the introduction, the second part consists of a literature review that examines both theoretical and empirical studies, providing insights into the connection between theory and practice. The third section introduces the background information regarding the research and methodology. Following the analysis and findings of the study, the authors proceed to engage in discussions and explore the implications. Ultimately, this paper concludes by summarizing the main points, providing recommendations, suggesting areas for future research, and acknowledging any limitations.

**Literature Review**

This section clarifies the connection between theory and practice by incorporating the suggestions of Social Information Processing (SIP) theory, the Affect Infusion Model (AIM) and the elements from the modified Unified Theory of Acceptance and Use of Technology (UTAUT) and the findings of prior empirical studies.

**Theoretical and Conceptual Background**

This study integrated the concepts of Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), the Unified Theory of Acceptance and Use of Technology (UTAUT), along with previous empirical research findings and predictions (Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Dobber, 1998; Chegugu, 2018; Polong, 2022; Wijaya, 2022; Ibrahim et al., 2023) to develop the research model and formulate hypotheses. The SIP theory was employed to examine the process by which individuals establish connections and develop perceptions of others in computer-mediated communication (CMC) environments. Furthermore, the SIP theory is employed to examine the impact of affective states or moods on judgments, decisions, and behavior within the workplace. The Affect Infusion Model (AIM) is employed to examine the influence of emotions on various workplace behaviours, including motivation, creativity, performance, communication, and organizational autonomy (Forgas & George, 2001). Similarly, the SIP theory is employed to examine the intensity of attitudes, particularly the notion of attitude significance. Psychology research examines how the subjective significance of attitudes impacts their functioning, resistance to change, information processing, memory organization, emotional responses, and behavioral intentions. Comprehending the intensity of attitudes is crucial for interventions aimed at modifying behavior and for practical implementations (Howe & Kronnick, 2017). UTAUT was employed in this study to enhance the explanatory capability and practicality of the SIP and AIM in different situations.

However, several potential criticisms have been presented regarding the Social Information Processing (SIP) theory, the Affect Infusion Model (AIM) and the original Unified Theory of Acceptance and Use of Technology (UTAUT): First and foremost, the SIP theory has the potential to streamline the intricacies of social information processing. Although it provides a valuable structure for comprehending how individuals develop perceptions and connections in computer-mediated communication (CMC) environments, it may not adequately encompass the subtleties and unique variations in how individuals interpret social information (Chaiken & Trope, 1999). Moreover, the theory has predominantly been examined in societies that are Western, educated, industrialized, wealthy, and democratic. Hence, its suitability for diverse cultural contexts remains uncertain. Additional cross-cultural research is necessary to ascertain the universality of the principles of SIP theory as proposed by Chaiken and Trope (1999).

Moreover, the theory has faced criticism due to its lack of precision in predicting the specific characteristics of impressions and relationships that will develop in computer-mediated communication (CMC) environments. Although it implies that impressions and relationships will eventually resemble in-person interactions, it does not make any specific forecasts about the exact attributes of these interactions (Chaiken & Trope, 1999). The application of SIP theory has predominantly been observed in computer-mediated communication (CMC) environments that rely on text-based interactions. Further investigation and adjustment of the theory may be required to account for its relevance in contemporary forms of computer-mediated communication (CMC), such as video conferencing and social media, which often involve the use of nonverbal cues (Chaiken & Trope, 1999).

Although SIP theory offers valuable insights into social information processing in computer-mediated communication (CMC) environments, it is important to recognize its limitations and explore the integration of other theories to achieve a more comprehensive understanding of social cognition and behavior in diverse settings. Similarly, the theory of social information processing (SIP) primarily emphasizes the cognitive aspects, potentially neglecting the significance of emotions and affective states in the development of relationships and the formation of impressions. By incorporating ideas from theories like the Affect Infusion Model (AIM) and UTAUT a more thorough comprehension of social information processing can be achieved (Forgas & George, 2001). This study...
integrated the SIP theory with the Affect Infusion Model (AIM) to gain a deeper understanding of the determinants of use behavior of e-procurement system. This was done by examining how buyers' and suppliers' attitude mediate this impact. The Affect Infusion Model (AIM) is an information processing theory that elucidates the influence of affective states or moods on judgments, decision-making, and organizational behavior (Forgas & George, 2001). The framework explores the impact of emotions on various work-related behaviors such as 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 emphasizes the significance of information processing strategies in moderating emotional influences on organizational behavior. It implies that emotions can greatly influence how individuals perceive and react to different workplace scenarios. The AIM enhances comprehension of the intricate relationship between emotions and behavior in the workplace by integrating affect into current theories and research (Forgas & George, 2001). The Affect Infusion Model (AIM) has greatly enhanced our comprehension of how affective states impact social judgments. Nevertheless, similar to any theoretical framework, it has faced criticism for yielding incongruous outcomes when employed in health-related choices, as certain studies have been unable to reproduce the anticipated mood-congruence effects (Dobber, 1998). This inconsistency raises doubts about the AIM's resilience in different situations. The AIM operates by eliciting affective states through a range of techniques, such as audio-visual and autobiographical methods. Nevertheless, doubts have been raised about the efficacy of these methods in eliciting authentic emotional experiences, which could potentially affect the credibility of the findings (Dobber, 1998). The AIM has predominantly undergone testing in controlled laboratory environments with individuals who are in good health. The extent to which it can be applied to real-life scenarios, different groups of people, and different cultural environments is uncertain, which restricts its ability to be widely applicable (Dobber, 1998). The AIM may oversimplify the intricate interplay between affective states and social judgments. It posits a direct correlation between emotions and decision-making, but this oversimplifies the intricate nature of real-life decision-making processes (Forgas, 2013; Martin & Clore, 2013). The AIM focuses on the cognitive aspects of emotional influences. By incorporating it with other theories that examine how emotions impact social judgments, such as the Social Information Processing (SIP) theory, a more thorough comprehension of the effects of emotions on behavior can be achieved (Forgas, 2013; Martin & Clore, 2013).

The AIM's processing continuum, which posits that constructive judgments are more susceptible to affective influences, may not have universal applicability. Regardless of the processing strategy employed, different individuals or circumstances may exhibit varying degrees of affect infusion (Forgas, 1995; Forgas, 1994). The AIM acknowledges the significance of target, evaluator, and contextual factors in recruiting diverse cognitive approaches. Nevertheless, the specific mechanisms through which these variables affect the infusion of emotions remain unknown and necessitate additional research (Forgas, 1995; Forgas, 1994). Ultimately, although the Affect Infusion Model has made noteworthy advancements in our comprehension of how emotions affect social evaluations, it is not exempt from constraints. To enhance the explanatory capability and practicality of the AIM in different situations, it is necessary to address these criticisms through further research and theoretical enhancements. This study employed the Unified Theory of Acceptance and Use of Technology (UTAUT) because the theory can explain about 70% of the variation in behavioral intention to use information technologies (IT) (Dwivedi et al., 2017) in order to overcome the limitations of AIM. However, in recent years, several authors have actively questioned the original UTAUT's accuracy in predicting behavioral intention to use information technology (IT), despite its ability to predict around 70% of the variation. In their study, Dwivedi et al. (2017) contend that factors such as gender, age, experience, and voluntariness do not influence the connections between constructs and use behavior. This argument was substantiated by several prior empirical investigations that excluded the four moderators suggested by Venkatesh et al. (2003) and introduced additional factors such as attitude (Dwivedi et al., 2017; Venkatesh et al., 2016; Venkatesh et al., 2012). This study aims to show that attitudes have a direct impact on e-procurement system usage patterns, a matter that has received little attention in previous empirical and theoretical literature. In addition, this study builds on the modified Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Dwivedi et al. (2017) which revealed the indirect impact of attitude on use behavior. Figure 1 depicts the modified UTAUT model developed by Dwivedi et al. (2017).

Figure 1: Modified UTAUT; Source: Dwivedi et al. (2017)
Empirical Review and Hypothesis Development

Use Behavior

Use behavior refers to the actions and activities individuals engage in when utilizing a particular technology, service, or product. It encompasses the actual usage patterns, habits, and interactions that individuals exhibit when employing a specific tool or service (Farzin et al., 2021; Wang & Qi, 2021; Harborth et al., 2020). In the context of this article, the term “use behavior” refers to the immediate cause of a person's behavior, indicating their willingness to continue using an e-procurement system. It was hypothesized that this use behavior is directly influenced by the attitudes of both buyers and suppliers. This factor was not considered in the modified UTAUT model proposed by Dwivedi et al. (2017). Furthermore, the use behavior in the context of this article was anticipated to be indirectly influenced by performance expectancy and effort expectancy through the attitude of buyers and suppliers. This aspect is currently not well understood in the existing literature regarding e-procurement adoption. Understanding use behavior is essential for predicting user actions and improving the design and implementation of technologies and services to better meet users' needs and preferences. For example, the study by Dong et al. (2022) revealed that behavioral attitude, subjective norm, perceived behavioral control, perceived usefulness, and perceived ease of use significantly impact farmers' intention to adopt rice-shrimp crop technology. In addition, Kramer et al. (2021) discovered that a normative stakeholder management approach positively impacts use behavior, allowing businesses to gain productivity advantages. Furthermore, Nuryyev et al. (2020) assert that strategic orientation, owner/managers' personal characteristics, and social influence have a strong effect on the intention to adopt new technology, with perceived usefulness and perceived ease of use mediating these effects. Wang et al. (2022) revealed that relative advantage, compatibility, competitive pressure, technological maturity, organizational readiness, and policy impact the intention to adopt blockchain through perceived usefulness or perceived ease of use. Similarly, the study by Farzin et al. (2021) showed that performance expectancy, effort expectancy, facilitating conditions, habit, hedonic motivation, perceived value, and triability significantly impact M-banking adoption intention. Based on these facts from prior literature, this study predicted that, use behavior would be influenced by performance expectancy, effort expectancy and attitude of buyers and suppliers in implementation and innovation of e-procurement system.

Performance Expectancy

According to Shatta (2023), performance expectancy refers to the extent to which the use of an e-procurement system would provide advantages to suppliers in carrying out certain tasks in the procurement process. In addition, the study by Rizkalla et al. (2023) indicated that performance expectancy is the extent to which users believe that using technology will increase productivity and effectiveness in achieving their goals and the results showed that this factor can positively influence the attitude towards using digital providers. In this article, performance expectancy is defined as the extent to which the use of an e-procurement system will provide advantages for the key stakeholders, namely buyers and suppliers. Performance expectancy has a significant impact on attitude and use behavior in various contexts. A positive performance expectancy can lead to a more positive attitude towards using technology, which can ultimately influence behavioral intention and use behavior. For example, a positive performance expectancy indicates that customers believe that using M-banking will improve their performance, leading to a higher intention to adopt the technology. Various studies collectively demonstrate the significant impact of performance expectancy on attitude and adoption behavior across different technological domains and services (Shatta & Shayo, 2021; Dwivedi et al., 2017; Shatta, 2023; Shaikh et al. 2018; Pangaribuan & Wulandari, 2019; Rizkalla et al., 2024; Batara et al., 2017; Shatta & Mabina, 2024). As an example, the revised Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Dwivedi et al. (2017) anticipated that performance expectancy would have a beneficial influence on the attitude of technology users. The findings demonstrated a positive path coefficient, indicating a substantial and statistically meaningful association. Similarly, the empirical research conducted by Shatta (2020d) posited that performance expectancy had a beneficial impact on the adoption of e-procurement systems. The results indicated a positive path coefficient, and the link was determined to be statistically significant. Likewise, the study by Shatta and Mabina (2024) revealed the significant impact of performance expectancy on attitude and on e-procurement adoption. Likewise, Khchine et al. (2023) revealed that customers believe that using M-banking will improve their performance, leading to a higher intention to adopt the technology.

Based on the results of previous studies (Batara et al., 2017; Shaikh et al. 2018; Pangaribuan & Wulandari, 2019; Rizkalla et al., 2023; Khchine et al., 2023; Shatta & Mabina, 2024), this study hypothesized that performance expectancy would have a favorable impact on the attitude and usage behavior of buyers and suppliers towards adoption of e-procurement systems.

H15: Performance Expectancy (PE) positively and directly effects attitude (AT) of buyers and suppliers

H16: Performance Expectancy (PE) positively and indirectly effects Use Behavior (UB) of e-Procurement System through the attitude (AT) of buyers and suppliers

Effort Expectancy

According to San et al. (2020), effort expectancy refers to an individual's sense of how easy it is to utilize technology (San et al., 2020, p. 23). Likewise, Rizkalla et al. (2023) assert that effort expectancy refers to users' beliefs about the ease of using technology; when perceived as easy to use, users are more likely to adopt it. In the context of this article, effort expectancy is defined as the view
of both the buyer and supplier about the level of ease associated with using an e-procurement system. Effort expectancy plays a crucial role in shaping users' attitudes and behavioral intentions towards technology adoption, influencing their actual use behavior. It is a significant factor alongside other predictors in determining users' acceptance and use of technology in different contexts. Prior studies collectively demonstrate the crucial role of effort expectancy in shaping users' attitudes towards technology adoption and usage behavior across different domains (Dwivedi et al., 2017; Shatta, 2023; Shaikh et al. 2018). In addition, effort expectancy influences users' perceptions of ease of use, which in turn affects their overall attitude towards the technology or service being considered for adoption (Pangaribuan & Wulandari, 2019; Rizkalla et al., 2023; Batara et al., 2017; Farzin et al., 2021; Wibowo, 2023). For example, the study by Wibowo (2023) revealed that effort expectancy and facilitating conditions influence the intention to use QRIS, while attitude mediates the impact of these factors on behavioral intention. Furthermore, the study by Farzin et al. (2021) indicates that effort expectancy is one of the factors that significantly impact M-banking adoption intention. Effort expectancy, along with other factors like performance expectancy, social influence, facilitating conditions, habit, hedonic motivation, perceived value, and trialability, plays a crucial role in predicting customer behavioral intentions towards M-banking adoption. To validate the results of prior research in the context of e-procurement, this article suggests that the effort expectancy by buyers and suppliers would have a positive impact on their use behavior via their attitude.

**H0:** Effort Expectancy (EE) positively and directly effects attitude (AT) of buyers and suppliers

**H1:** Effort Expectancy (EE) positively and indirectly effects Use Behavior (UB) of e-Procurement System through the attitude (AT) of buyers and suppliers

### Attitude

Attitude can be defined as a psychological tendency expressed by evaluating a particular entity with some degree of favor or disfavor (Rizkalla et al., 2023). Attitudes are inner tendencies that lead to evaluative responses expressing preferences or biases towards specific entities or behaviors. In various contexts, attitudes play a crucial role in shaping individuals' behaviors and decision-making processes (Han et al., 2020). However, attitudes are not only evaluative but also motivational, affecting individuals' choices and actions (Waithaka & Kimani, 2021a). Attitudes represent individuals' predispositions towards entities or behaviors, reflecting their evaluations and preferences (Shatta, 2023). Attitude plays a crucial role in shaping users' behavioral intentions and use behavior towards technology adoption. A positive attitude towards technology can lead to a higher intention to use it, which in turn influences actual use behavior. Farzin et al. (2021) revealed that M-banking adoption intention positively affects actual use behavior, and word-of-mouth communication also influences actual use behavior, mediating the relationship between adoption intention and use behavior. A technology perceived as easy to use is more likely to be adopted by users, indicating a positive attitude towards its use (Rizkalla et al., 2023). The influence of attitude on use behavior has inadequately been studied in various contexts, shedding light on the direct and positive relationship. In the context of this article, attitude is defined as the favorable mindset of buyers and suppliers towards the usage of e-procurement system. Various studies collectively demonstrate that attitude plays a pivotal role in influencing users' intentions and behaviors towards adopting technology or engaging in specific behaviors (Shatta et al., 2020a; Han et al., 2020; Rizkalla et al., 2023; Shatta et al., 2020c; Dwivedi et al., 2017; Shatta et al., 2020b). For example, a research conducted by Dwivedi et al. (2017) revealed that attitude has a favorable impact on the behavioral intention to adopt new technologies, and this relationship was determined to be statistically significant (p value < 0.05). In addition, Khechine et al. (2023) revealed that attitude fully mediates the relationship between performance expectancy and behavioral intention, indicating that a positive performance expectancy leads to a positive attitude, which in turn influences behavioral intention. Similarly, Wibowo (2023) revealed that attitude mediates the impact of performance expectancy, effort expectancy, and facilitating conditions on behavioral intention to use digital transactions that employs a standardized quick response code. Subsequent researches are required to provide a rationale for these results in the context of e-procurement adoption (Dwivedi et al., 2019). Hence, the present paper postulated that attitude of buyers and suppliers would have a positive influence on their use behavior of e-procurement system.

**H1:** Attitude (AT) positively and directly influences Use Behavior (UB)

### Conceptual Model of the Study

The conceptual model was developed to evaluate the assumptions about the impact of performance expectation, effort expectancy, and attitude on the behavior of consumers and suppliers, based on both theoretical and empirical perspectives.

Figure 2 shows the conceptual model of the study.
The article utilized the mathematical model $x = lY + e$ to demonstrate the connection between a hidden variable and its observable indicators illustrated in Figure 2. In this model, $x$ represents the observed indicator variable, $Y$ represents the latent variable, $l$ denotes the loading which quantifies the relationship's intensity between $x$ and $Y$, and $e$ represents the random measurement error (Sarstedt et al., 2022; Shatta, 2023; Shatta & Mabina, 2024).

**Mathematical Model for Operationalization of the Conceptual Model**

The adoption of positivism philosophy was driven by the need to empirically examine the hypotheses inherent in the research. Furthermore, the study used descriptive and explanatory cross-sectional survey research techniques to gather data from a specific group of buyers and suppliers. The data collection was conducted once, and a sample of this population was studied (Creswell & Plano, 2018). Similarly, this research used a survey methodology to obtain data, since it enables the collection and quantitative analysis of data via the use of descriptive and inferential statistics. The process of data collection involved distributing a questionnaire link to both buyers' and suppliers' WhatsApp groups, as well as their email addresses. During the period from October to November 2023, participants responded to the survey by utilizing a Google Form. This study employed a survey questionnaire comprising of two sections: demographic factors (respondent type and education level) and latent constructs (attitude, effort expectancy, performance expectancy, and use behavior). The study employed stratified sampling to test the hypotheses, and the tenth guideline suggested by Hair et al. (2019) for utilizing PLS-SEM and SmartPLS software in data analysis was employed to determine the minimum number of respondents required to test the research model.

According to Hair et al. (2019), the tenth rule of thumb states that the minimum sample size needed to test the hypotheses of a proposed research model is equal to ten times the number of indicators for the exogenous construct. In this study, the exogenous constructs consist of four indicators for performance expectancy and effort expectancy. According to the tenth rule of thumb, a sample size of 383 respondents was deemed enough, as it exceeded the minimal requirement of respondents to test the proposed research model. Furthermore, closed-ended surveys were given numerical values to streamline and enhance the accuracy of quantitative data analysis. The quantitative data obtained for respondents' profile were evaluated using descriptive statistics with the assistance of IBM SPSS Statistics Software Version 26. Inferential statistical analysis was conducted to evaluate the hypotheses using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4 software. The SmartPLS 4 program used the Extra response approach to address missing data. This research used the value of 99 as a substitute for twenty (20) missing values that were included in the questionnaires. However, this approach facilitated the establishment of a structured distinction between data that was seen and data that was not observed (Hair et al., 2019).

**Evaluation of Models**

This study used Partial Least Squares Structural Equation Modeling (PLS-SEM) assessment techniques for reflective models. This choice was made because of the characteristics of the constructs and their indicators in the theoretical research model shown in Figure 3. Since all indicators relied on their constructions, a reflective model was deemed suitable for this investigation. The evaluation of the measurement model and the structural model of the proposed research model followed the criteria set by Hair et al. (2019). The process of evaluating the reflective measurement models involved several stages. Firstly, the reliability of the indicators was examined, with a requirement that the reliability value should be greater than 0.708. Secondly, the internal consistency reliability of the composite reliability of constructs was assessed, with a threshold of greater than 0.708. Thirdly, the convergent validity of the constructs was evaluated using the Average Variance Extracted (AVE) value, which should be greater than 0.5. Lastly, the discriminant validity was assessed using the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion, which should be less than 0.9. In addition, the collinearity of the constructs in the structural model was assessed. As to Hair et al. (2019), the VIF values should ideally be around 3 or below.
Once collinearity was accounted for, the primary factors used to evaluate the structural model in PLS-SEM were as follows: path coefficients with a significance level, t-statistic more than 1.96 at a significance level of 0.05 for all pathways is considered acceptable, and p-values of 0.05 or below are deemed significant. The $R^2$ values of 0.75, 0.50, and 0.25 may be categorized as significant, moderate, and weak correspondingly (Hair et al., 2019). Similarly, $f^2$ effect sizes greater than 0.02, 0.15, and 0.35 indicate small, medium, and large impact sizes respectively (Hair et al., 2019). The predictive relevance, as measured by the $Q^2$ effect size, is considered significant when its value is more than zero (Becker et al., 2018). In general, the assessment findings for both the measurement and structural models were satisfactory and satisfied all the criteria set by Hair et al. (2019).

**Summary of Variables, Indicators, Measurement, Data Analysis Method and Tool.**

The summary of variables, indicators, measurement, data analysis method and tool are presented in Table 1.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Indicators</th>
<th>Measurement Level</th>
<th>Analysis Method</th>
<th>Analysis Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Behavior (UB) of e-Procurement System</td>
<td>Continue interesting the system, continue learning the system, continue using the system, continue enjoying the benefits of the system</td>
<td>Ordinal</td>
<td>PLS-SEM</td>
<td>SmartPLS 4</td>
</tr>
<tr>
<td>Mediator Variable</td>
<td>Indicators</td>
<td>Measurement Level</td>
<td>Analysis Method</td>
<td>Analysis Tool</td>
</tr>
<tr>
<td>Attitude (AT)</td>
<td>Personal opinion on the system, intention to learn the system, intention to use the system, intention to continue taking advantages of the system</td>
<td>Ordinal</td>
<td>PLS-SEM</td>
<td>SmartPLS 4</td>
</tr>
<tr>
<td>Independent Variables</td>
<td>Indicators</td>
<td>Measurement Level</td>
<td>Analysis Method</td>
<td>Analysis Tool</td>
</tr>
<tr>
<td>Performance Expectancy (PE)</td>
<td>Simplify procurement process, payment process, reduction of corruption chances, reduction of procurement time cycle</td>
<td>Ordinal</td>
<td>PLS-SEM</td>
<td>SmartPLS 4</td>
</tr>
<tr>
<td>Effort Expectancy (EE)</td>
<td>Easy learning, easy using, become skillful, flexible to interact</td>
<td>Ordinal</td>
<td>PLS-SEM</td>
<td>SmartPLS 4</td>
</tr>
</tbody>
</table>

**Source:** Conceptualized from Literature, 2024

**Findings and Discussions**

**Demographic Characteristics of the Respondents**

The majority of participants, approximately 56%, identified themselves as buyers, while approximately 44% identified themselves as suppliers. The findings of this study align with prior research conducted by Siwandeti et al. (2021a; 2021b), which also reported a limited response from vendors. Furthermore, around 39.7 percent of the participants were holding a bachelor's degree. These findings align with the prior research conducted by San et al. (2020), in which the majority of respondents had a bachelor's degree. Therefore, the data provided by the participants in this research was comprehensive and genuine. Otherwise, the findings from these surveys would be influenced by the characteristics and responses of individuals who participated but lacked education or were not buyers or suppliers using the e-procurement system. Table 2 displays the demographic characteristics of the participants.

<table>
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<tr>
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<tr>
<td>Diploma Level</td>
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<td>Bachelor Degree</td>
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<td>Masters</td>
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<tr>
<td>PhD</td>
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<td>Total</td>
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<th>Education Level</th>
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<tr>
<td>Suppliers</td>
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<td>Total</td>
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<th>Education Level</th>
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<td>Suppliers</td>
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<table>
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<th>Education Level</th>
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<td>Suppliers</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyers</td>
<td>168</td>
</tr>
<tr>
<td>Suppliers</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
</tr>
</tbody>
</table>
Indicator’s Reliabilities, R² Values and Relevance of the Path Coefficients

Upon implementing the PLS-SEM algorithm, Figure 3 displays the loadings of all indicators for the constructs, which were found to be over the required threshold of 0.708, as suggested by Hair et al. (2019). Similarly, the Composite Reliability (CR) of all constructs exceeded 0.708, and the Average Variance Extracted (AVE) values of all constructs were more than 0.5. Based on these findings, each construct accounted for over 50 percent of the indicator’s variability, indicating satisfactory item dependability (Hair et al., 2019). Furthermore, Figure 2 demonstrates that the R² values were 0.496 and 0.603, respectively. In this research, the findings indicated that about 49.6 percent of the variance in attitude (AT) was impacted by the exogenous variables Performance Expectancy (PE) and Effort Expectancy (EE). Furthermore, the study found that a significant portion, namely 60.3 percent, of the variability in the behavior of buyers and suppliers may be attributed to the combined effects of Performance Expectancy (PE) and Effort Expectancy (EE), together with the mediator attitude (AT). Moreover, all proposed connections exhibited positive path coefficients, indicating that a one standard deviation increase in the exogenous constructs (Performance Expectancy (PE) and Effort Expectancy (EE)), along with the mediator attitude (AT), resulted in an increase in the rate of mindset change among buyers and suppliers. This, in turn, led to an increase in the rate of e-procurement system usage behavior.

Reliability and Convergent Validity Analysis Results

According to Hair et al. (2019), a construct is deemed reliable if its composite reliability (CR) value is better than 0.708. Additionally, for a construct to have convergent validity, its Average Variance Extracted (AVE) value should be larger than 0.5. The reliability of all constructs in this paper was assessed using composite reliability (CR) values, which were found to be more than 0.708. Additionally, the convergent validity of all constructs was evaluated using the Average Variance Extracted (AVE) value, which was found to be better than 0.5. The results suggest that there were favorable response patterns seen in this study, and each construct came together to explain the variability of its item (Hair et al., 2019). Table 3 displays the findings on the reliability and validity of the constructs.

Table 3: Reliability and Convergent Validity Analysis Results

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach's Alpha</th>
<th>Composite Reliability</th>
<th>Average Extracted (AVE)</th>
<th>Variance Ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude (AT)</td>
<td>0.930</td>
<td>0.948</td>
<td>0.784</td>
<td></td>
</tr>
<tr>
<td>Effort Expectancy (EE)</td>
<td>0.793</td>
<td>0.865</td>
<td>0.617</td>
<td></td>
</tr>
<tr>
<td>Performance Expectancy (PE)</td>
<td>0.861</td>
<td>0.906</td>
<td>0.706</td>
<td></td>
</tr>
<tr>
<td>Use Behavior (UB)</td>
<td>0.932</td>
<td>0.944</td>
<td>0.679</td>
<td></td>
</tr>
</tbody>
</table>
Discriminant Validity Analysis HTMT Results

For all associations examined in the research model, the HTMT values were less than 0.90. This indicates that each construct in the proposed research model was empirically separate from the other constructs in the structural model (Hair et al., 2019). Table 4 displays the results of the discriminant validity study using the HTMT measure.

Table 4: Discriminant Validity Analysis (HTMT Results)

<table>
<thead>
<tr>
<th></th>
<th>Attitude (AT)</th>
<th>Effort Expectancy (EE)</th>
<th>Performance Expectancy (PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort Expectancy (EE)</td>
<td>0.732</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Expectancy (PE)</td>
<td>0.718</td>
<td>0.882</td>
<td></td>
</tr>
<tr>
<td>Use Behavior (UB)</td>
<td>0.830</td>
<td>0.662</td>
<td>0.762</td>
</tr>
</tbody>
</table>

Q² Predict Results

The study found that the values of Q² for attitude (AT) and Use Behavior (UB) were above zero, suggesting that the exogenous constructs (Effort Expectancy (EE) and Performance Expectancy (PE)) in the research model had predictive ability. Table 5 displays the Q² findings for the internal structures of the study model being offered.

Table 5: Q² Predict Results

<table>
<thead>
<tr>
<th></th>
<th>Q²predict</th>
<th>RMSE</th>
<th>MAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude (AT)</td>
<td>0.441</td>
<td>0.757</td>
<td>0.519</td>
</tr>
<tr>
<td>Use Behavior (UB)</td>
<td>0.404</td>
<td>0.778</td>
<td>0.557</td>
</tr>
</tbody>
</table>

Collinearity Statistics by VIF Metric for Inner Model

The study examined collinearity statistics using the Variance Inflation Factor (VIF). The VIF values for all items were below 3, indicating that there were no issues with collinearity in the predictor constructs of the proposed research model. Table 6 displays the collinearity statistical results for the inner model of the suggested research model, utilizing the VIF metric.

Table 6: Collinearity Statistics (VIF) for Inner Model Results

<table>
<thead>
<tr>
<th></th>
<th>Attitude (AT)</th>
<th>Use Behavior (UB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort Expectancy (EE)</td>
<td>1.855</td>
<td></td>
</tr>
<tr>
<td>Performance Expectancy (PE)</td>
<td>1.855</td>
<td></td>
</tr>
</tbody>
</table>

F² Values Results

Based on the research conducted by Hair et al. (2019), effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large F² values, respectively. The study found that the effect sizes (F²) for all associations were 0.093, 0.176, and 1.518. These values indicate the existence of minor, medium, and high effect sizes, respectively, for all hypotheses of the research model. The study's F² values findings are shown in Table 7.

Table 7: F² Values Results

<table>
<thead>
<tr>
<th></th>
<th>Attitude (AT)</th>
<th>Use Behavior (UB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort Expectancy (EE)</td>
<td>0.176</td>
<td></td>
</tr>
<tr>
<td>Performance Expectancy (PE)</td>
<td>0.093</td>
<td></td>
</tr>
</tbody>
</table>

Statistical Significance of the Tested Hypothesized Relationships

Figure 4 demonstrates that all proposed associations were confirmed (with p values below 0.05), indicating that the conceptual research model of this study is applicable for managerial decisions making. This phenomenon may be attributed to the presence of all postulated connections in actuality. The statistical significance of the tested hypotheses is shown in Figure 4.
Independent Variables | Mediator Variable | Dependent Variable
--- | --- | ---
PE1 | AT1 | UB1
PE2 | AT2 | UB2
PE3 | AT3 | UB3
PE4 | AT4 | UB4
EE1 | EE2 | UB5
EE2 | EE3 | UB6
EE3 | EE4 | UB7
EE4

Figure 4: Statistical Significance Results of the Tested Hypotheses

Importance-Performance Map Analysis Results

The construct attitude in Figure 5 is situated higher than the average of the importance and performance of the target construct use behavior. This positioning is logical as it suggests that it is crucial to prioritize and allocate more resources towards altering the mindset (attitude) of buyers and suppliers during the implementation and reformation of the e-procurement system. However, the constructs of effort expectancy and performance expectancy are ranked below the average of the importance of the target construct, use behavior. This suggests that these constructs have a limited influence on the target construct. Nevertheless, these constructs are situated higher than the average on the performance map of the target construct (use behavior), indicating that they are also important while implementing and reforming the e-procurement system.

![Importance-performance map](image)

Figure 5: Importance-Performance Map Analysis Results

Additional Analysis for Testing the Types of Mediation

The type of mediation effects present in the proposed study paradigm were examined. As per the findings of Hair et al. (2019), full mediation is shown when the direct impact is not statistically significant (p value > 0.05) but the indirect effect is statistically significant (p value < 0.05). However, partial mediation refers to a situation where both the indirect and direct effects are statistically
significant (Hair et al., 2019). Given this fact, further study was conducted to comprehend the kind of mediation present in the suggested model. Hence, the postulated model included the direct impacts of effort expectancy and performance expectancy on use behavior. Following the bootstrapping procedure, it was seen that the direct impact of effort expectancy on use behavior was not statistically significant (p value > 0.05), however its indirect impact was determined to be statistically significant (p value < 0.05), indicating the presence of complete mediation. Both the direct and indirect impacts of performance expectancy on use behavior were found to be statistically significant (p value < 0.05), indicating the presence of partial mediation. Based on these data, it can be stated that the predicted study model demonstrates both partial and full mediation effects. The findings for determining the kinds of mediation effects are shown in Figure 6.

### Discussion

#### The Hypotheses Tested for the Proposed Research Model

This research proposed that the level of performance expectancy would have a direct positive impact on attitude and an indirect impact on use behavior. The results showed that there is a direct relationship between performance expectancy and attitude of buyers and suppliers, as well as attitude change and the rate of use behavior of the e-procurement system. Specifically, these findings imply that an increase of one standard deviation in performance expectancy leads to an increase in the rate of mindset change of buyers and suppliers, which in turn leads to an increase in the rate of use behavior of the e-procurement system. Furthermore, the findings demonstrated statistically significant correlations (p value < 0.05), indicating the presence of these linkages in actuality. The findings align closely with the updated Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Dwivedi et al. (2017). However, the limited understanding of the indirect impact of performance expectancy on use behavior through the attitudes of buyers and suppliers is considered a valuable theoretical and empirical contribution. This aspect has not been adequately explored in previous literature (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016; Almajali, 2023; Elias, 2021; Shatta & Shayo, 2021; San et al., 2020; Alias, 2018; Waithaka & Kimani, 2021b; Ndei & Mutuku, 2021; Ratnawati & Suryawan, 2021).

Nevertheless, this research predicted that the level of effort expectancy by buyers and suppliers would have a direct impact on their attitude and an indirect effect on their usage behavior. The findings indicated that there were positive path coefficients, suggesting that an increase of one standard deviation of effort expectancy would result in an increase in the rate of change in the attitude of buyers and suppliers. This, in turn, would lead to an increase in the rate of use behavior shown by buyers and suppliers. The results of this study align with recent research (Dwivedi et al., 2017) which found that effort expectancy had a significant beneficial effect (p value < 0.05) on attitude and technology use through behavioral intention. However, the findings regarding the indirect impact of effort expectancy on use behavior through the attitudes of buyers and suppliers is regarded as new theoretical contribution because both the modified and original UTAUT models (Venkatesh et al., 2012; Venkatesh et al., 2003) had not comprehended this kind of relationship. These models demonstrated that effort expectancy has an indirect significant influence on use behavior through behavioral intention (p value > 0.05).

Moreover, this research postulated that attitude would have a direct impact on the procuring and supplying behavior of buyers and suppliers. The findings indicate that there are positive path coefficients, suggesting that a one standard deviation rise in attitude would
result in a corresponding increase in the rate of change in use behavior among buyers and suppliers. These results contradict the findings of earlier research, which showed a significant positive influence (p value < 0.05) of attitude on the behavioral intention to adopt technology (Dwivedi et al., 2017). Thus, these findings are considered as theoretical contribution since they are less considered in the previously established theories and models (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016; Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Dobber, 1998; Chegugu, 2018; Polong, 2022; Wijaya, 2022; Ibrahim et al., 2023).

Figure 7: Verified Model; Source: Authors

Conclusions

Theoretical contribution has been made to existing modified theories and models as a result of filling the identified theoretical gap, as shown by the results in Figure 7. The relationship between performance expectancy and effort expectancy as predictors of use behavior with the mediation of attitude, has been thoroughly understood based on the modified UTAUT framework proposed by Dwivedi et al. (2017). This understanding fills a gap in the existing theoretical and empirical literature (Willy & Paul, 2021; Yuliawati & Kurniawan, 2021; Masudin et al., 2021; Alehegn, 2021; Siwandeti et al., 2021b; Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Forgas & George, 2001; Forgas, 1994; Forgas, 1995; Dobber, 1998; Chegugu, 2018; Polong, 2022; Wijaya, 2022; Ibrahim et al., 2023; Venkatesh et al., 2012; Venkatesh et al., 2016). Figure 7 displays the conclusive model that has been verified.

In addition, the statistical significance of performance expectancy in both direct and indirect interactions indicates that buyers and suppliers base their choice on e-procurement adoption solely on the performance expectancy of the e-procurement system. The statistical analysis indicates that the impact of effort expectancy on use behavior is only significant indirectly, while it is not significant when it comes to direct influence. This suggests that buyers and suppliers do not rely directly on effort expectancy when making decisions about using e-procurement systems. However, the effort expectancy of the system can indirectly influence to change their mindset and lead them to implement the system. The findings shown in Figure 5 validate the value of the proposed research model in guiding management decision-making, specifically in prioritizing investment concerns during the deployment or innovation of an e-procurement system.

However, this research used a limited set of components, namely "performance expectancy, effort expectancy, and attitude," derived from the modified UTAUT framework developed by Dwivedi et al. (2017). These factors accounted for only 65 percent of the variability in use behavior, as seen in Figure 6. The study suggests that future research should include more dimensions from the modified UTAUT by Dwivedi et al. (2017) in order to increase the diversity in use behavior from a modest 65 percent to a large level. According to Hair et al. (2019), R² values of 0.75, 0.50, and 0.25 may be categorized as considerable, moderate, and weak, respectively. Similarly, this research used buyers and suppliers only from Tanzania. Given this observation, this study suggests that future research should include suppliers and buyers from many countries in order to generalize the proposed model for e-procurement implementation and innovations.

Furthermore, this study employed a deductive approach and applied a forecasting research methodology. Regarding this matter, the study suggests prioritizing either a ranking and forecasting type of relationship, a forecasting and comparison type of relationship, a ranking and comparison type of relationship, an inductive approach, or a mixed approach for future studies. The study has significant implications for the Social Information Processing (SIP) theory, the Affect Infusion Model (AIM), the modified Unified Theory of Acceptance and Use of Technology (UTAUT), empirical literature, and practical aspects. These implications can potentially lead to changes in how buyers and suppliers interact with e-procurement systems and also influence their mindset. Additionally, this study employed a cross-sectional research design. Subsequent studies could investigate the longitudinal effects of e-procurement adoption, evaluating changes over time and under different economic circumstances. This would enhance the comprehension of the various factors that impact usage behavior in a more dynamic manner. Studying how technological advancements and digital transformation
affect users’ attitudes and behaviors towards e-procurement can provide valuable insights for improving and innovating procurement systems.

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Author Contributions: Conceptualization, formal analysis, investigation, resources, writing original draft preparation, Deus N. Shatta, writing review and editing, Bahati K. Mabina

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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