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Article

Evaluating the Impact of Conversational AI Integration in ERP Systems: A Structural Equation Modelling Approach Using the U-CAI Architecture

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Abstract: Enterprise Resource Planning (ERP) systems are core systems for integrating organisational processes, information resources and decision-making activities. However, the widespread adoption of ERP systems has not solved a long-standing usability problem: users are still faced with complex interfaces, extensive navigation structures and process-intensive workflows. Recent advances in Conversational Artificial Intelligence (AI) and Large Language Models (LLMs) present new opportunities to streamline enterprise interactions using natural language communication. ERP adoption, ERP implementation success, technology acceptance, and AI-enabled information systems have been widely studied in prior research. However, recent studies have begun emphasising the potential of conversational AI in the enterprise context. Yet, there is no empirical evidence on how conversational AI affects user behaviour, cognitive workload, task efficiency, and adoption in ERP systems under a single unified theoretical and mathematical framework. To bridge this gap, the present study proposes and empirically validates the Unified Conversational Artificial Intelligence (U-CAI) framework for conversational AI-enabled ERP environments by integrating the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), Cognitive Load Theory (CLT), and Human–Computer Interaction (HCI) principles to examine the relationships among Conversational AI Usability, Trust in AI Systems, Cognitive Load Reduction, ERP Task Efficiency, User Adoption Intention, and ERP User Experience. A quantitative research design based on survey data collected from 300 ERP users from different organisational sectors. The proposed hypotheses were tested using regression analysis, mediation analysis, moderation analysis and Structural Equation Modelling (SEM). The results indicate that Conversational AI Usability significantly enhances ERP Task Efficiency and reduces Cognitive Load, and Trust in AI Systems has a positive effect on User Adoption Intention. Cognitive Load Reduction partially mediates the effect of usability on efficiency, while ERP User Experience has a significant moderating effect on this relationship. Collectively, these results validate the U-CAI framework and show that conversational AI can improve ERP usability, reduce cognitive load, improve operational performance, and help users adopt them in today's enterprise environments.
Keywords: Conversational Artificial Intelligence; Enterprise Resource Planning; U-CAI Architecture; Cognitive Load Reduction; Structural Equation Modelling; Human–Computer Interaction

1. INTRODUCTION

1.1 Motivation and Background

Enterprise Resource Planning (ERP) systems are important in the digital transformation of organisations as they integrate business processes, information resources and decision activities in a common environment [4], [5]. Today's ERP platforms support finance, procurement, inventory management, supply chain operations, customer relationship management, and human resource management. Organisations want operational efficiency and strategic co-ordination

. In addition, recent studies have highlighted the importance of ERP adoption along with automation and machine learning technologies for enhancing productivity and data-driven decision making in contemporary enterprises [25], [26]. But these advantages come at a price. Traditional ERP platforms can require users to navigate complex interfaces, transaction codes and multi-step workflows, resulting in increased cognitive effort and decreased operational efficiency [3], [6], [7]. Such complexity, if not taken into consideration, can degrade user productivity, system utilisation and overall organisation performance [27]–[29].

Recent advancements in Artificial Intelligence (AI) in particular Large Language Models (LLMs) have allowed users to interact with information systems in natural language [12]–[16]. Conversational AI technologies have already shown great potential to increase accessibility, usability and task performance in domains such as customer service, healthcare, education and enterprise applications [17], [18]. Conversational interfaces, in particular for ERP systems, allow users to receive information and perform business processes with natural language commands, easing user interaction and improving operational efficiency [17], [18]. The unified conversational artificial intelligence (U-CAI) architecture was proposed as a framework for supporting secure and reliable conversational interaction in enterprise environments by integrating conversational intelligence, deterministic enterprise resource planning (ERP) execution and enterprise security controls [24]. Based on this architecture, the present study investigates the joint impact of Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI) and ERP User Experience (EUX) on the effectiveness of conversational AI-enabled ERP systems.

1.2 Research Gap and Problem Statement

Although the adoption of ERP and the use of AI-enabled information systems have been widely researched, comparatively little research has specifically examined the behavioural and operational impact of conversational AI in ERP settings [17], [18], [24]. Prior work has mostly covered customer-oriented chatbots, virtual assistants and general AI [9]–[11], [24]. Enterprise ERP systems, on the other hand, need workflow compliance, security and role-based access control, and thus are relatively underexplored. Another limitation is that previous research mainly has studied usability, trust, cognitive factors and technology adoption as separate phenomena, rather than combining them into one analytical framework. However, there is little empirical evidence regarding the effect of Conversational AI Usability on ERP Task Efficiency through Cognitive Load Reduction, or on the effect of ERP User Experience on these relationships [3], [6], [23]. Moreover, there are only a few studies that integrate theoretical basis, mathematical modelling and Structural Equation Modelling (SEM) validation into a single framework for conversational AI-enabled ERP environments [20]–[22]. To fill these gaps, this study proposes and empirically validates the Unified Conversational Artificial Intelligence (U-CAI) framework by integrating CAU, TAI, CLR, ETE, UAI, and EUX to evaluate the effectiveness of conversational AI-enabled ERP systems and tests the proposed relationships using SEM.

1.3 Research Objectives

The objectives of the study are:

O1. Develop a unified U-CAI framework for evaluation of conversational AI-enabled ERP systems integrating TAM, UTAUT, CLT, and HCI principles.

O2. Explore the effect of Conversational AI Usability (CAU) and Trust in AI Systems (TAI) on ERP Task Efficiency (ETE), Cognitive Load Reduction (CLR) and User Adoption Intention (UAI).

O3. To investigate the mediating effect of Cognitive Load Reduction (CLR) between CAU and ETE.

O4 To explore the moderating role of ERP User Experience (EUX) in the relationship between CAU and ETE and validate the framework by Structural Equation Modelling (SEM).

1.4 Research Contributions

The study contributes three main points to the enterprise systems and conversational AI literature:

Theoretical contribution This research integrates the Technology Acceptance Model (TAM) [1], the Unified Theory of Acceptance and Use of Technology (UTAUT) [2], Cognitive Load Theory (CLT) [3] as well as Human – Computer Interaction (HCI) principles [6–8], into an integrated model for conversational ERP environments, extending the application of these theories to AI-enabled ERP systems based on the U-CAI architecture [24]. Methodological contribution: Mathematical representations of the proposed framework are formulated and empirically validated through regression analysis, mediation analysis, moderation analysis and Structural Equation Modelling (SEM) techniques [20]–[22]. Practical Contribution: The results provide insights to organisations interested in applying conversational AI technologies in ERP system to improve usability, decrease cognitive load, boost operational efficiency and increase user acceptance [17], [18], [24].

2. THEORETICAL BACKGROUND

2.1 Technology Acceptance Model (TAM) Model

Davis [1] proposed the Technology Acceptance Model (TAM) to explain the adoption of technology by perceived usefulness and perceived ease of use. In the context of Enterprise Resource Planning (ERP), usability is a major factor influencing users' performance and the overall effectiveness of the system. Traditional ERP systems typically have intricate navigation structures and process-heavy workflows which increases the interaction effort [4], [5]. This problem is solved by conversational AI, which is facilitating natural language interaction so that information retrieval and task completion in ERP systems become easier [17], [18]. Thus, TAM is the theoretical basis for exploring the effect of Conversational AI Usability (CAU) on ERP Task Efficiency (ETE).

2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. [2] explains user adoption through performance expectancy, effort expectancy, social influence and facilitating conditions. Trust has become an important factor that influences the adoption behaviour of AI-enabled enterprise systems. Users are more likely to adopt intelligent systems when they believe that they are reliable, transparent and beneficial [9]–[11], [19]. In the proposed framework, Trust in AI Systems (TAI) is a key predictor of User Adoption Intention (UAI) and reflects users' confidence in conversational AI-enabled ERP systems.

2.3 Cognitive Load Theory (CLT)

Cognitive Load Theory (CLT) states that heavy cognitive effort impacts task performance and quality of decisions [3]. Another reason for cognitive load is that traditional ERP systems often have complicated workflows, transaction codes and navigation paths users have to go through [4], [5]. Conversational AI mitigates these limitations with natural language that may offer quicker access to information and task completion [17], [18].

Thus, Cognitive Load Reduction (CLR) is expected to play an important role in enhancing ERP Task Efficiency.

2.4 Human–Computer Interaction (HCI) Perspective

Research in Human-Computer Interaction (HCI) has demonstrated that the effectiveness of technology depends on usability, accessibility and user-centred system design [6]–[8], [23]. The usage of conversational ERP systems and the gain from the systems' performance are influenced by user experience. Users with different levels of ERP knowledge and operational experience will respond differently to conversational interfaces. So, ERP User Experience (EUX) is added as a moderating construct into the proposed framework.

2.5 U-CAI Architecture Foundation

The Unified Conversational Artificial Intelligence (U-CAI) architecture provides a secure framework for integrating conversational AI capabilities with ERP systems [24]. It combines natural language understanding, dialogue management, deterministic ERP execution, and enterprise security mechanisms to support reliable business operations. Unlike general-purpose conversational systems, U-CAI is purpose-built for enterprise environments where security, governance, and workflow compliance are essential requirements, and it supplies the conceptual foundation for evaluating conversational AI-enabled ERP systems.

2.6 Conceptual Research Framework

Drawing upon TAM, UTAUT, CLT, HCI principles, and the U-CAI architecture [1]–[3], [6]–[8], [24], this study proposes a conceptual framework comprising six constructs: Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI), and ERP User Experience (EUX). The framework proposes that CAU positively influences both ETE and CLR, while TAI positively influences UAI; CLR mediates the relationship between CAU and ETE, and EUX moderates that same relationship. Figure 1 illustrates the proposed U-CAI conceptual framework, which forms the basis for the mathematical modelling and empirical validation carried out through Structural Equation Modelling (SEM) [20]–[22].

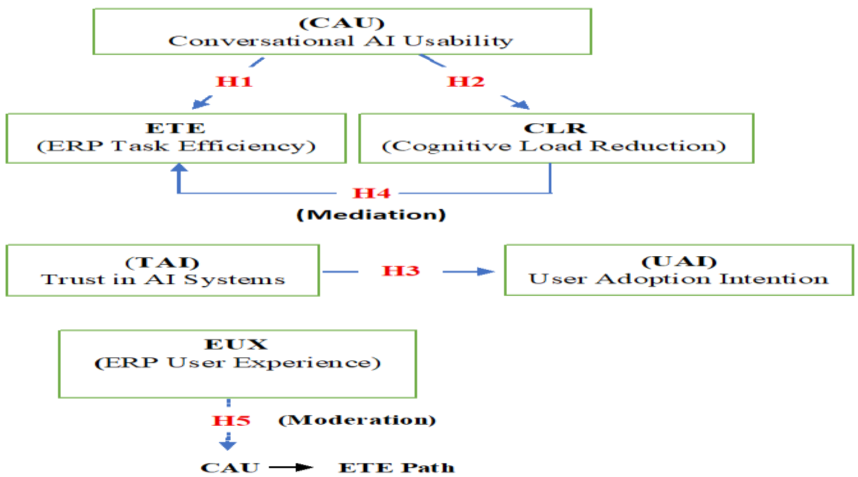

Figure 1. Proposed U-CAI Conceptual Research Framework

Figure 1 illustrates the proposed U-CAI conceptual research framework, which presents five hypothesized relationships. Conversational AI Usability is expected to positively influence (ETE) ERP Task Efficiency (H1) and (CLR) Cognitive Load Reduction (H2), while (TAI) Trust in AI Systems is expected to positively influence (UAI) User Adoption Intention (H3). CLR is further proposed to mediate the relationship between Conversational AI Usability and ERP Task Efficiency (H4), and (EUX) ERP User Experience is proposed to moderate that same relationship (H5).

The proposed U-CAI framework integrates TAM, UTAUT, CLT and HCI theories and the U-CAI architecture [24] to explain how conversational AI technologies influence usability, cognitive processing, task performance and adoption behaviour in ERP environments. It is the basis for the mathematical model, hypothesis development and the subsequent empirical validation, through Structural Equation Modelling (SEM) [20]–[22].

Table 1. Summary of Theoretical Foundations

Theory	Core Principle	U-CAI Construct(s)	Research Role
TAM [1]	Perceived usefulness and ease of use	CAU, ETE	Supports H1
UTAUT [2]	Behavioral intention and technology adoption	TAI, UAI	Supports H3
CLT [3]	Cognitive effort reduction	CLR	Supports H2 & H4

HCI [6]–[8], [23]	User-centered interaction and usability	EUX	Supports H5
U-CAI [24]	Secure conversational ERP architecture	All Constructs	Conceptual Foundation

3. MATHEMATICAL REPRESENTATION OF THE U-CAI FRAMEWORK

This mathematical model is based on the conceptual framework of the Technology Acceptance Model (TAM) [1], the Unified Theory of Acceptance and Use of Technology (UTAUT) [2], Cognitive Load Theory (CLT) [3] and the U-CAI architecture [24]. The proposed equations capture the direct, mediating and moderating effects of the six constructs of the framework.

The proposed Unified Conversational Artificial Intelligence (U-CAI) framework explains the improvement of Enterprise Resource Planning (ERP) system performance and user experience through conversational AI capabilities and is organised around six latent constructs: Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI), and ERP User Experience (EUX).

Mathematical relationships between these constructs are as follows.

3.1 Models with Direct Effect

Conversational AI Usability → ERP Task Efficiency. The impact of Conversational AI Usability on ERP Task Efficiency is demonstrated by:

Equation (1)

$ETE = \alpha_1 + \beta_1(CAU) + \varepsilon_1$

Equation (2)

$CLR = \alpha_2 + \beta_2(CAU) + \varepsilon_2$

Equation (3)

$UAI = \alpha_3 + \beta_3(TAI) + \varepsilon_3$

Here, α is the intercept term, β is the standardised path coefficient, and ε is the random error term, and these equations are directly congruent with H1, H2, and H3.

3.2 Mediation Model

The mediating role of Cognitive Load Reduction is illustrated following the mediation framework by Baron and Kenny [22] as:

Equation (4)

Indirect Effect

Total Effect

IE is the indirect effect and TE is the total effect. A statistically significant indirect effect would provide support for the mediating role of Cognitive Load Reduction in enhancing ERP Task Efficiency.

3.3 Moderation Model

The framework also suggests the moderating role of ERP User Experience between Conversational AI Usability and ERP Task Efficiency. The moderation model is expressed as:

Equation (5)

$$ETE = \alpha_5 + \beta_6(CAU) + \beta_7(EUX) + \beta_8(CAU \times EUX) + \varepsilon_5$$

3.4 Structural Representation of the U-CAI Framework

The U-CAI framework is realised in a system of interrelated structural links between Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI), and ERP User Experience (EUX). The framework suggests direct, mediating and moderating effects as illustrated in equations (1) - (5).

These structural relationships imply that Conversational AI Usability has a direct and indirect impact on ERP Task Efficiency via Cognitive Load Reduction and Trust in AI Systems has an impact on User Adoption Intention. However, ERP User Experience moderates the impact of Conversational AI Usability on ERP Task Efficiency. These relationships collectively constitute the analytical framework for the empirical validation via Structural Equation Modelling (SEM) techniques [20], [21].

4. RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

4.1 Research Model

This study used the conceptual framework and mathematical representation to examine the relationships among the constructs of Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI) and ERP User Experience (EUX). Based on TAM, UTAUT, CLT, and HCI perspectives, the model investigates direct, mediating, and moderating effects on the integration of conversational AI in ERP settings [1]–[3], [6]–[8]. The primary independent variables are Conversational AI Usability and Trust in AI Systems. The primary dependent variables are ERP Task Efficiency and User Adoption Intention. Cognitive Load Reduction is a mediating variable, and ERP User Experience is a moderating variable.

4.2 Conversational AI Usability and ERP Task Efficiency

TAM asserts that systems that are perceived as easy to use are more likely to improve user performance and operational effectiveness [1]. Conversational AI communicates in natural language to make ERP navigation less complex and improve access to organisational information [17], [18]. Thus improved usability is expected to improve ERP task performance [4], [5].

H1: Conversational AI Usability (CAU) has a positive effect on ERP Task Efficiency (ETE).

4.3 Conversational AI Usability and Cognitive Load Reduction

Cognitive Load Theory states that a decrease in mental effort leads to an increase in task performance and effectiveness in decision-making [3]. By replacing complex menus and transaction codes with natural language interaction, conversational AI can reduce the cognitive load of ERP operations [17], [18]. Thus, conversational usability is expected to contribute to a reduction in cognitive load.

H2: Cognitive Load Reduction (CLR) is positively affected by Conversational AI Usability (CAU).

4.4 Trust in AI Systems and User Adoption Intention

Trust is a central factor affecting technology adoption especially in AI-enabled settings where users depend on the recommendations and information produced by the system [9]–[11]. Users' perception of reliability, security and trustworthiness of conversational AI systems is positive for their adoption intentions (UTAUT) [2], [19].

H3: Trust in AI Systems (TAI) has a positive impact on User Adoption Intention (UAI).

4.5 The Intermediary Function of Cognitive Load Reduction

Conversational AI may boost the efficiency of ERP tasks not only directly but also indirectly by decreasing the cognitive effort of users. A lower cognitive load allows the user to focus on performing the task and making decisions, instead of navigating the system [3], [22]. Thus, we propose Cognitive Load Reduction as the mediating mechanism for the effect of conversational usability on task efficiency.

H4: Conversational AI Usability (CAU) has a positive relationship with ERP Task Efficiency (ETE) through Cognitive Load Reduction (CLR).

4.6 Moderating Role of ERP User Experience

HCI research suggests that users with different levels of system experience derive different benefits from technological innovations [6]–[8], [23]. Less experienced ERP users are likely to benefit more from conversational interfaces, since these reduce learning complexity and navigation effort. ERP User Experience is therefore expected to influence the strength of the relationship between conversational usability and task efficiency.

H5: ERP User Experience (EUX) moderates the relationship between Conversational AI Usability (CAU) and ERP Task Efficiency (ETE).

5. METHODOLOGY OF RESEARCH

5.1 Research Methodology

This study adopts a quantitative cross-sectional research design to evaluate the impact of the integration of Conversational Artificial Intelligence (AI) in Enterprise Resource Planning (ERP) Systems. The proposed U-CAI framework is inspired by concepts from the Technology Acceptance Model (TAM) , the Unified Theory of Acceptance and Use of Technology (UTAUT) , Cognitive Load Theory (CLT) and Human–Computer Interaction (HCI) principles . The main analytic technique used was Structural Equation Modelling (SEM) as it allows for the simultaneous examination of measurement and structural relationships between latent constructs while accounting for measurement error [20], [21].

5.2 Data collection and sampling

The target population consisted of ERP users from manufacturing, information technology, banking, healthcare, education, and service industries, who use SAP, Oracle ERP, Microsoft Dynamics, and Odoo platforms in their organisations. Data were collected through a structured questionnaire that was distributed online using professional networks and organisational contacts. Participants with experience in ERP were recruited through convenience and snowball sampling. In total, 300 valid responses were collected, meeting the recommended sample size requirements for SEM analysis [20], [21].

Table 2. Respondent Demographic Profile (n = 300)

Variable	Category	Frequency	Percentage (%)
Gender	Male	174	58
	Female	120	40
	Other	6	2
ERP Experience	0–2 Years	102	34
	3–6 Years	123	41
	7+ Years	75	25
Education	Bachelor's Degree	126	42
	Master's Degree	105	35

	MBA	45	15
	Other	24	8
ERP Platform	SAP	114	38
	Oracle	66	22
	Microsoft Dynamics	54	18
	Odoo	42	14
	Others	24	8

5.3 Measuring instrument

We created a structured questionnaire grounded on well-known scales on technology acceptance, trust in AI, cognitive load, usability and user experience [1]–[3], [6]–[11]. The instrument was slightly adapted to conversational AI-enabled ERP environments.

The instrument consisted of twenty-eight measurement items in six constructs, namely, Conversational AI Usability (CAU: 6 items), Trust in AI Systems (TAI: 5 items), Cognitive Load Reduction (CLR: 5 items), ERP Task Efficiency (ETE: 5 items), User Adoption Intention (UAI: 4 items), and ERP User Experience (EUX: 3 items). All constructs were measured by five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) except for ERP User Experience which was measured by indicators of experience duration, proficiency level and frequency of ERP usage.

5.4 Assessment of Reliability and Validity

Before testing the hypotheses, the reliability and validity of the measures were examined. Internal consistency reliability was assessed with Cronbach's Alpha and Composite Reliability (CR) and CR above 0.70 was considered acceptable [20]. Average variance extracted (AVE) was used to test convergent validity and values above 0.50 indicate good construct validity. Discriminate validity was measured using Fornell–Larcker criterion. Confirmatory Factor Analysis (CFA) was performed to test the adequacy of the measurement model and confirm the factor structure of constructs [21].

5.5 Statistical Analysis Method

The data analysis took place in a number of stages. Descriptive statistics and correlation analysis were performed to describe respondent characteristics and to examine preliminary relationships among variables. Multiple regression analysis was used to test H1–H3, the indirect effect proposed in H4 was assessed via mediation analysis with the application of bootstrapping procedures, and H5 was tested using moderated regression analysis [22]. Finally, SEM was used to test the overall U-CAI framework. The model adequacy was tested by well-known goodness-of-fit indices including Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), Standardised Root Mean Square Residual (SRMR), Goodness-of-Fit Index (GFI), and Normed Fit Index (NFI) [20], [21].

6. RESULTS AND ANALYSIS

6.1 Descriptive Statistics and Reliability Analysis

The descriptive statistics and reliability results of the study constructs are presented in Table 3. The highest mean score was reported for ERP Task Efficiency (ETE) ($M = 3.79$), with Conversational AI Usability (CAU) ($M = 3.72$) and Cognitive Load Reduction (CLR) ($M = 3.68$) close behind, indicating generally positive perceptions of conversational AI-enabled ERP systems. All constructs showed acceptable internal consistency with Cronbach's

Alpha values higher than the required level of 0.70. Composite Reliability (CR) and Average Variance Extracted (AVE) values met the recommended levels confirming reliability and convergent validity [20], [21].

Table 3. Statistics and Reliability Analysis Description					
Construct	**Mean**	**SD**	**Alpha**	**CR**	**AVE**
CAU	3.72	0.68	0.874	0.901	0.604
TAI	3.58	0.71	0.851	0.886	0.591
CLR	3.68	0.69	0.878	0.903	0.611
ETE	3.79	0.65	0.883	0.912	0.624
UAI	3.61	0.74	0.862	0.891	0.602
EUX	3.55	0.72	0.841	0.872	0.576

6.2 Correlation Analysis

The correlation matrix among the study variables is presented in Table 4. All constructs were significantly and positively correlated. CAU was highly and positively correlated with ETE and CLR, while TAI was most highly correlated with UAI. These results provide some preliminary support for the proposed framework and no evidence of multi-collinearity.

Table 4. Correlation Matrix						
Construct	**CAU**	**TAI**	**CLR**	**ETE**	**UAI**	**EUX**
CAU	1.000					
TAI	0.512	1.000				
CLR	0.587	0.431	1.000			
ETE	0.634	0.418	0.592	1.000		
UAI	0.421	0.672	0.387	0.465	1.000	
EUX	0.295	0.241	0.318	0.356	0.282	1.000

6.3 Testing the Hypothesis of a Direct Effect

H1–H3 were tested using multiple regression analysis. Conversational AI Usability had a significant effect on ERP Task Efficiency ($\beta = 0.512$, $p < 0.001$) and Cognitive Load Reduction ($\beta = 0.487$, $p < 0.001$). Trust in AI Systems had a significant and positive effect on User Adoption Intention ($\beta = 0.534$, $p < 0.001$). Hence, H1, H2 and H3 are supported.

Table 5 Results of the direct effect hypothesis tests					
Hypothesis	**Path**	**β**	**t-value**	**p-value**	**Decision**
H1	CAU → ETE	0.512	10.67	<0.001	Supported
H2	CAU → CLR	0.487	9.55	<0.001	Supported
H3	TAI → UAI	0.534	11.61	<0.001	Supported

6.4 Mediation Analysis

We employed bootstrapping analysis with 5,000 resamples to assess the mediating effect of Cognitive Load Reduction. The results indicate a significant indirect effect of Conversational AI Usability on ERP Task Efficiency through Cognitive Load Reduction (Indirect Effect = 0.200, 95% CI [0.131, 0.280]). Partial mediation was confirmed, and H4 is supported, as the direct effect remained significant after the introduction of the mediator.

Table 6. Mediation Analysis Results (H4)				
Relationship	Direct Effect	Indirect Effect	95% CI	Decision
CAU → CLR → ETE	0.312	0.2	[0.131, 0.280]	Supported

6.5 Moderator Analysis

To test the moderating role of ERP User Experience we performed moderated regression analysis. The interaction effect of CAU and EUX was statistically significant ($\beta = -0.198$, $p = 0.001$), suggesting that the positive effect of conversational AI usability on ERP task efficiency is more significant for less experienced ERP users. H5 is supported then.

Table 7. Results of the Moderation Analysis (H5)				
Interaction Path	**β**	**SE**	**p-value**	**Decision**
CAU × EUX → ETE	-0.198	0.061	0.001	Supported

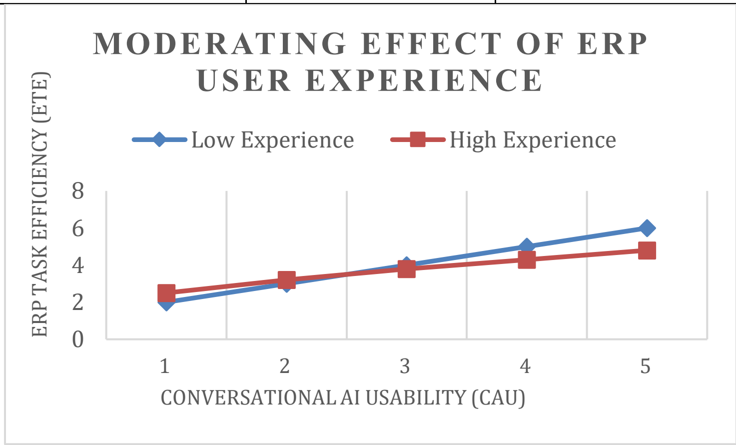

Fig. 2. Moderating Effect of ERP User Experience on the Relationship Between Conversational AI Usability and ERP Task Efficiency

Figure 2: The role of ERP User Experience as a moderator of the relationship between Conversational AI Usability and ERP Task Efficiency. The impact of conversational AI usability on the task efficiency is more positively pronounced for the users with lower ERP experience, and less positively pronounced for the users with higher ERP experience. This indicates that conversational interfaces provide improved performance benefits for the novice ERP users by reducing the learning complexity and the navigation effort.

6.6 Results of Structural Equation Modelling

The proposed U-CAI framework was evaluated using Structural Equation Modelling (SEM) for overall adequacy and all accepted indices revealed a satisfactory goodness-of-fit.

The Comparative Fit Index (CFI) was 0.954 and the Tucker–Lewis Index (TLI) was 0.947. The Root Mean Square Error of Approximation (RMSEA) was 0.062 and the Standardised Root Mean Square Residual (SRMR) was 0.048. In addition, the Goodness-of-Fit Index (GFI) and the Normed Fit Index (NFI) were greater than the suggested cut-off of 0.90.

These results indicate that the proposed U-CAI framework adequately represents the observed data and empirically supports the hypothesised relationships.

Table 8. Model fit statistics			
Index	Value	Recommended Threshold	Result
CFI	0.954	>0.90	Acceptable
TLI	0.947	>0.90	Acceptable
RMSEA	0.062	<0.08	Acceptable
SRMR	0.048	<0.08	Acceptable
GFI	0.931	>0.90	Acceptable
NFI	0.942	>0.90	Acceptable

6.7 Summary of Hypothesis Testing

All five hypotheses we proposed were supported by the results of hypothesis testing. ERP Task Efficiency and Cognitive Load were strongly influenced by Conversational AI Usability. Trust in AI Systems positively influenced User Adoption Intention. The relationship between usability and efficiency was partially mediated by Cognitive Load Reduction. ERP User Experience played a significant moderator role in the relationship between usability and efficiency.

Table 9. Hypothesis Summary		
Hypothesis	**Relationship**	**Result**
H1	CAU → ETE	Supported
H2	CAU → CLR	Supported
H3	TAI → UAI	Supported
H4	CAU → CLR → ETE	Supported
H5	CAU × EUX → ETE	Supported

7. DISCUSSION

These results provide empirical support for the proposed U-CAI framework and show the potential of conversational AI to improve ERP usability, operational performance and technology adoption. The significant positive impact of Conversational AI Usability (CAU) on ERP Task Efficiency (ETE) supports the Technology Acceptance Model (TAM), which suggests that intuitive and user-friendly systems enhance task performance and operational effectiveness [1]. Conversational AI provides natural language interaction, which reduces the complexity of navigation and increases access to ERP functionalities, leading to increased productivity [17], [18]. These results support recent research indicating that ERP adoption, automation, and intelligent technologies play a critical role in organisational productivity and operational effectiveness [25], [26], and indirectly support the U-CAI architecture proposed by Mishra et al. [24], indicating the successful integration of conversational AI into ERP environments to improve user interaction and operational results. The results also validate that Conversational AI Usability has a positive impact on Cognitive Load Reduction (CLR), which is supporting Cognitive Load Theory (CLT) [3]. Conversational interaction makes the systems easier to use and less mentally taxing, as opposed to traditional ERP systems, where users typically have to deal with complicated workflows and interfaces [4], [5]. This reduction of cognitive burden leads to better performance of ERP as earlier mentioned in terms of ERP effectiveness and success of implementation [28], [29].

Trust in AI systems (TAI) was a significant predictor of user adoption intention (UAI) in line with UTAUT and past work on trust [2], [9]–[11], [19]. The finding underlines the importance of reliability, transparency, and security in driving the adoption of conversational AI-enabled ERP solutions.

The results of the mediation analysis show that the Cognitive Load Reduction partially mediates the association between Conversational AI Usability and ERP Task Efficiency, indicating that the conversational AI improves the ERP performance through better usability and lower mental workload [3], [22]. In addition, ERP User Experience (EUX) significantly moderated the relationship between CAU and ETE, indicating that conversational interfaces may be more beneficial for less experienced ERP users, consistent with the HCI principles that emphasise how user characteristics shape system effectiveness [6]–[8], [23].

This study theoretically integrates TAM, UTAUT, CLT and HCI principles under one unified framework for conversational AI-enabled ERP systems. The practical implications of the findings suggest that organisations should emphasise usability, trust, explainability, and user-centric design when deploying conversational AI technologies in ERP environments, with particular benefits likely to accrue in organisations with large numbers of novice ERP users. The findings further support the prior research on ERP adoption and implementation success in Indian organisational settings [27]–[29].

8. CONCLUSION

This research proposed and empirically validated the Unified Conversational Artificial Intelligence (U-CAI) framework to investigate the effect of conversational AI integration in Enterprise Resource Planning (ERP) systems. Based on the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Cognitive Load Theory (CLT), and Human-Computer Interaction (HCI) principles, the study examined the relationships between Conversational AI Usability (CAU), Trust in AI Systems (TAI), Cognitive Load Reduction (CLR), ERP Task Efficiency (ETE), User Adoption Intention (UAI), and ERP User Experience (EUX). 300 ERP users' findings, analysed through regression analysis, mediation analysis, moderation analysis and Structural Equation Modelling (SEM) confirmed that Conversational AI Usability directly improves ERP Task Efficiency, Cognitive Load is reduced and Trust in AI Systems positively influences User Adoption Intention. Cognitive Load Reduction partially mediates usability and efficiency and is moderated by ERP User Experience. The results validate the proposed U-CAI framework and demonstrate that conversational AI can be helpful in enhancing the usability, operational performance, and user adoption of ERP in enterprise settings. The study contributes to the emerging literature on AI-enabled enterprise systems by offering an integrated theoretical and empirical framework and guidance for practice to organisations seeking to implement conversational AI-driven ERP solutions. Future research can extend the framework e.g. by longitudinal studies, industry-specific studies and real-world deployments of conversational ERP.

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