

Adoption of AI in ERP Systems for Tax Administration and Compliance in Bread Manufacturing SMEs: Towards Enhanced Performance and Productivity

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Abstract

The integration of Artificial Intelligence (AI) into Enterprise Resource Planning (ERP) systems presents significant opportunities for improving tax administration and compliance among Small and Medium Enterprises (SMEs), particularly in traditional industries. This study investigates the adoption of AI-enabled ERP systems among bread manufacturing SMEs in the National Capital Region (NCR) and CALABARZON, Philippines. Anchored on the People–Process–Technology (PPT) framework and the Unified Theory of Acceptance and Use of Technology (UTAUT), the research examines how performance expectancy, effort expectancy, social influence, and facilitating conditions influence behavioral intention, adoption intention, and actual system usage. The study also integrates trust and ethical considerations to extend the traditional adoption model.

Using a quantitative cross-sectional design, data were collected from 153 accounting personnel from ERP-using SMEs through a validated survey instrument. Descriptive statistics and Spearman's Rank Correlation were employed to analyze relationships among variables. Findings indicate high readiness in people and process dimensions, particularly in ERP training and tax compliance workflows. However, technological infrastructure—especially network stability and system support—remains a major constraint. Although behavioral intention and adoption intention were rated high, no significant relationship was found between behavioral intention and actual usage ($r = 0.05$, $p > 0.05$), confirming a pronounced intention–behavior gap.

The study concludes that infrastructural limitations, rather than user resistance, hinder AI-enabled ERP adoption. A strategic intervention framework is proposed to strengthen infrastructure readiness, ethical AI governance, digital capability, and sustainable tax compliance among SMEs.

Keywords: Artificial Intelligence (AI), Enterprise Resource Planning (ERP), AI-Enabled ERP Systems, Unified Theory of Acceptance and Use of Technology (UTAUT), Ethical AI Governance

1. Introduction

The rapid digitalization of tax systems and the growing integration of Artificial Intelligence (AI) into Ent-

Enterprise Resource Planning (ERP) platforms are reshaping how businesses manage compliance and operational processes. In the Philippines, while the ERP market continues to expand, traditional industries such as bread manufacturing remain constrained by infrastructural limitations and resource scarcity. Despite the recognized potential of AI-enabled ERP systems to enhance tax reporting accuracy, reduce manual errors, and improve operational productivity, adoption among Small and Medium Enterprises (SMEs) in this sector remains limited.

Bread manufacturing SMEs operate within a complex regulatory environment, particularly in meeting Bureau of Internal Revenue (BIR) requirements for digital tax compliance. Although existing technology adoption models, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), explain behavioral intention through constructs like performance expectancy and effort expectancy, they often overlook contextual constraints such as infrastructure readiness, trust, and ethical considerations. In resource-constrained environments, these structural and governance factors may significantly influence whether intention translates into actual system use.

This study addresses this gap by examining the adoption of AI-enabled ERP systems for tax administration and compliance among bread manufacturing SMEs in the National Capital Region (NCR) and CALABARZON. Anchored on the People–Process–Technology (PPT) framework and UTAUT, the research explores the relationship between behavioral intention, adoption intention, and actual usage, while integrating trust and ethical governance as critical dimensions of digital transformation.

The Hypothesis of the study include the following:

Ho1: There is no significant relationship between behavioral intention and adoption intention of AI-enabled ERP systems in bread manufacturing SMEs.

Ho2: There is no significant relationship between behavioral intention and actual usage of AI-enabled ERP systems in bread manufacturing SMEs.

2. METHODOLOGY

2.1 Research Design

This study employed a quantitative, cross-sectional research design to examine the adoption of AI-enabled Enterprise Resource Planning (ERP) systems for tax administration and compliance among bread manufacturing SMEs. The quantitative approach was selected to measure relationships among predefined variables and to test hypotheses grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) and the People–Process–Technology (PPT) framework.

Data were collected at a single point in time to assess current levels of readiness, behavioral intention, adoption intention, and actual system usage. The design enables objective statistical analysis of relationships among constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, and actual AI-ERP utilization.

2.2 Participants and Sampling

The study focused on bread manufacturing Small and Medium Enterprises (SMEs) located in the National Capital Region (NCR) and CALABARZON, Philippines. A multi-stage screening process was conducted to identify eligible firms, beginning with official Department of Trade and Industry (DTI) listings. From the identified population, 153 SMEs confirmed active use of ERP systems and were included in the study. Total population sampling was applied due to the manageable and clearly defined number of ERP-using firms within the sector.

The respondents were accounting personnel within these SMEs, selected based on their direct involvement in tax reporting, compliance processes, and ERP usage. Eligibility required hands-on ERP experience related to tax functions to ensure informed and reliable responses.

2.3 Instrumentation

Data were gathered using a structured, validated survey questionnaire designed to measure variables under the PPT framework and UTAUT constructs. The instrument consisted of four main sections:

1. People, Process, and Technology (PPT) factors
2. Behavioral Intention (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions)
3. Adoption Intention
4. Actual Usage of AI-enabled ERP systems

The questionnaire utilized a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). The instrument underwent pilot testing, and reliability analysis using Cronbach's Alpha confirmed acceptable internal consistency ($\alpha \geq 0.70$ across constructs). In addition to survey responses, selected ERP usage indicators and compliance-related records were reviewed to support descriptive validation of reported system use.

2.4 Data Analysis

Descriptive statistics (frequency and percentage distributions) were used to assess levels of agreement across PPT factors, UTAUT constructs, adoption intention, and actual usage. To test the relationships among variables, Spearman's Rank Correlation ($\alpha = 0.05$) was employed due to the ordinal nature of Likert-scale data. Correlation analysis examined:

- Behavioral Intention vs. Adoption Intention
- Behavioral Intention vs. Actual Usage

The statistical analysis aimed to determine whether positive behavioral intention significantly translated into actual AI-enabled ERP system utilization within the SMEs.

3. Results and Discussion

This section presents and analyzes the empirical findings of the study on the adoption of AI-enabled Enterprise Resource Planning (ERP) systems for tax administration and compliance among bread manufacturing Small and Medium Enterprises (SMEs) in NCR and CALABARZON. The results are organized according to the study objectives and interpreted within the frameworks of People–Process–Technology (PPT) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Descriptive statistics were used to determine levels of readiness, behavioral intention, adoption intention, and actual usage, while Spearman's Rank Correlation was applied to examine the relationships among key variables. The findings reveal important distinctions between psychological readiness and structural capability, highlighting the presence of an intention–behavior gap that provides deeper insight into the challenges of AI-enabled ERP adoption in resource-constrained SME environments.

3.1 People-Process-Technology (PPT) Readiness

Table 1. Descriptive Statistics for People, Process, and Technology Factors (n = 153)

Factor	Mean (M)	SD	SD (%)	D (%)	N (%)	A (%)	SA (%)	Interpretation
People	3.66	0.84	1.1	10.0	29.0	41.4	18.5	High Readiness
Process	3.51	0.79	0.4	12.4	35.3	39.4	12.4	Moderate-High
Technology	3.57	0.88	1.5	9.8	34.7	38.6	15.4	Moderate

The People factor (M = 3.66) demonstrates strong organizational readiness in terms of employee training, adaptability, and willingness to adopt AI-enabled ERP systems. With nearly 60% of respondents agreeing or strongly agreeing that employees are adequately prepared, the findings indicate that human resistance is not the primary obstacle to AI integration. This supports the premise of the PPT framework that human capability forms the foundation of successful digital transformation.

The Process factor (M = 3.51) reflects moderately high integration of ERP workflows with tax compliance requirements. SMEs show structured use of ERP for VAT reporting, withholding tax preparation, and compliance documentation. However, the 35.3% neutrality suggests that workflows may not yet be fully standardized across all departments. This partial integration may limit the ability of AI features to operate on fully harmonized datasets.

The Technology factor (M = 3.57) appears moderately positive overall; however, further disaggregation reveals significant variability across infrastructure components. While security and system responsiveness are rated positively, network stability presents a critical weakness, which may constrain advanced AI deployment.

3.2 Technology Infrastructure Disaggregation

Table 2. Technology Sub-Dimensions

Sub-Dimension	Mean (M)	Key Concern
AI Functional Capability	3.74	High conceptual readiness
Server & Computing Infrastructure	3.69	Moderate expansion capacity
Network & Connectivity	2.48	Structural weakness
Security & Authentication	3.92	Strongest dimension
Database Readiness	3.63	Organized but needs refinement
Performance Impact	3.89	Strong perceived benefit

The most significant finding in this section is the Network & Connectivity dimension (M = 2.48), which falls below the neutral midpoint and is substantially lower than other technology indicators. A majority of respondents (56.9%) disagreed that network infrastructure is stable. This confirms that infrastructural fragility is the primary structural constraint in AI-enabled ERP adoption.

In contrast, Security & Authentication (M = 3.92) emerged as the strongest dimension. Respondents expressed high confidence in cybersecurity controls and data protection mechanisms. This finding is important because it indicates that trust-related concerns (e.g., privacy, authorization, data misuse) are not

the central adoption barrier.

The results therefore suggest that the challenge is not ethical skepticism or data insecurity, but rather operational reliability. AI-driven ERP systems require persistent connectivity for cloud synchronization, anomaly detection, and real-time analytics. Without stable bandwidth, these advanced capabilities cannot function optimally.

3.3 Behavioral Intention (UTAUT Constructs)

Table 3. Behavioral Intention Toward AI-Enabled ERP Adoption

Construct	Mean (M)	SD	A+SA (%)	Interpretation
Performance Expectancy	3.83	0.76	66.3%	Strongest Predictor
Effort Expectancy	3.34	0.91	45.6%	Moderate Confidence
Social Influence	3.08	0.94	33.1%	Weakest Influence
Facilitating Conditions	3.37	0.88	43.6%	Structural Concern

Performance Expectancy (M = 3.83) is the strongest motivational driver. Over 66% of respondents believe AI-enabled ERP systems improve tax compliance accuracy and operational speed. This confirms that SMEs perceive tangible benefits from AI integration, aligning with UTAUT’s proposition that perceived usefulness significantly influences adoption intention.

Effort Expectancy (M = 3.34) reflects moderate confidence. While respondents are willing to learn, there remains uncertainty regarding ease of use and independent operation without extensive training. This suggests the need for structured AI-specific upskilling programs.

Social Influence (M = 3.08) is the weakest driver. SMEs appear less influenced by peer pressure or industry adoption trends. Instead, adoption appears internally motivated by operational needs rather than external conformity.

Facilitating Conditions (M = 3.37) reveal structural hesitation. Respondents are uncertain whether sufficient technical support and infrastructure are available. This perception directly corresponds to the previously identified network instability.

3.4 Adoption Intention and Actual Usage

Table 4. Adoption Intention and Actual Usage

Variable	Mean (M)	A+SA (%)	Interpretation
Adoption Intention	3.80	64.3%	High Commitment
Actual Usage (Tax Functions)	4.09	86.3%	Very High
Actual Usage (AI Features)	3.21	41.2%	Limited Deployment

Adoption intention remains high (M = 3.80), indicating strong willingness to continue and expand AI usage. SMEs express openness to exploring new AI features and recommending them within their organizations.

However, a distinction emerges between basic ERP tax functions (M = 4.09) and advanced AI features (M = 3.21). While compliance-related tasks are extensively automated and regularly used, predictive an-

alytics and anomaly detection remain underutilized. This suggests that ERP systems are functioning effectively as compliance tools but have not yet transitioned into fully AI-driven strategic intelligence platforms.

3.5 Correlation Analysis: Intention–Behavior Gap

Table 5 Spearman’s Rank Correlation ($\alpha = 0.05$)

Relationship	r	p-value	Interpretation
Behavioral Intention vs Adoption Intention	0.05	0.5548	Negligible
Behavioral Intention vs Actual Usage	0.05	0.5548	Not Significant

The correlation results reveal no statistically significant relationship between behavioral intention and actual usage ($r = 0.05, p > 0.05$). This finding is critical. Despite high psychological readiness (particularly strong Performance Expectancy), actual AI-enabled ERP usage does not increase proportionally. This confirms the presence of a pronounced intention–behavior gap.

From a theoretical standpoint, this suggests that in resource-constrained SME environments, Facilitating Conditions (particularly infrastructure readiness) may override motivational drivers. Even when users are willing and perceive benefits, structural constraints prevent actual behavioral execution.

3.6 Comprehensive Strategic Intervention Program for AI-Enabled ERP Adoption.

Based on the empirical findings particularly the identified intention–behavior gap ($r = 0.05, p > 0.05$) and the infrastructural weaknesses in network readiness a Comprehensive Strategic Intervention Program was developed. The intervention is grounded in the People–Process–Technology (PPT) framework and extends the UTAUT model by strengthening facilitating conditions as the critical enabler between behavioral intention and actual usage.

Table 6. Strategic Framework for the AI Enabled ERP Adoption

Strategic Pillar	Identified Gap	Strategic Action	Expected Outcome
People	High neutrality in AI confidence; moderate effort expectancy	Implement structured AI-specific training (predictive analytics, anomaly detection); continuous digital literacy programs	Increased effort expectancy and user confidence; improved AI feature utilization
Process	Partial workflow standardization; underutilized AI modules	Standardize tax compliance workflows; integrate AI-driven validation checkpoints; automate audit trail monitoring	Enhanced process transparency; improved tax compliance efficiency
Technology	Network instability ($M = 2.48$); limited infrastructure scalability	Upgrade broadband infrastructure; migrate to cloud-based ERP; implement redundancy systems	Improved facilitating conditions; reduced system downtime; reliable AI deployment

Strategic Pillar	Identified Gap	Strategic Action	Expected Outcome
Institutional Support	Weak social influence; limited visible leadership support	Executive-level AI adoption mandate; partnerships with ERP vendors and industry associations	Stronger organizational commitment; increased adoption intention
Ethical AI Governance	Trust concerns regarding algorithmic fairness and accountability	Develop internal AI ethics guidelines; transparent AI decision logs; periodic compliance audits	Strengthened trust; improved legitimacy of AI-driven decisions

The Comprehensive Strategic Intervention Program directly addresses the study’s central finding that the primary barrier to AI-enabled ERP adoption among bread manufacturing SMEs is structural rather than psychological. Although respondents demonstrated high performance expectancy and adoption intention, the insignificant correlation between behavioral intention and actual usage confirms that motivation alone is insufficient without strong facilitating conditions. The proposed framework therefore integrates five interconnected pillars—People, Process, Technology, Institutional Support, and Ethical AI Governance—to systematically close the intention–behavior gap. Structured AI-specific training strengthens effort expectancy and user confidence; standardized tax workflows enable deeper integration of predictive and anomaly detection features; infrastructure modernization, particularly broadband stabilization and cloud-based ERP migration, addresses the critical network constraint; executive endorsement and industry collaboration reinforce institutional legitimacy; and formal ethical AI guidelines enhance transparency, accountability, and trust. By aligning human capability, operational workflows, and technological infrastructure within a governance-oriented approach, the intervention transforms AI-enabled ERP from a compliance tool into a sustainable, intelligence-driven system capable of improving tax accuracy, operational productivity, and long-term digital maturity in resource-constrained SME environments.

4. Conclusion and Recommendations

Conclusion

This study investigated the adoption of AI-enabled ERP systems for tax administration and compliance among bread manufacturing SMEs in NCR and CALABARZON. Guided by the PPT framework and UTAUT, the findings show high human readiness and strong perceived benefits of AI, particularly in improving tax accuracy and efficiency. However, a negligible and insignificant relationship between behavioral intention and actual usage ($r = 0.05, p > 0.05$) confirms a clear intention–behavior gap. The results indicate that adoption barriers are structural rather than psychological, with network instability and limited infrastructure emerging as the primary constraints. The study underscores the importance of strengthening facilitating conditions to enable sustainable AI integration in resource-constrained SME environments.

Recommendations

In light of the findings, targeted interventions are necessary to address the structural constraints limiting AI-enabled ERP adoption among bread manufacturing SMEs. While human readiness and perceived usefulness are high, strengthening infrastructure and institutional support is essential to translate intention into sustained usage. The following recommendations are proposed:

- Upgrade technological infrastructure, particularly network stability and bandwidth capacity, and consider migration to cloud-based ERP systems to support AI-driven functionalities.
- Implement structured AI-specific training programs to enhance user confidence, improve effort expectancy, and ensure effective utilization of advanced features such as predictive analytics and anomaly detection.
- Standardize tax compliance workflows within ERP systems to enable full integration of AI modules and improve audit trail transparency.
- Strengthen leadership and institutional support through visible executive endorsement and collaboration with ERP vendors and industry associations.
- Develop internal ethical AI governance policies to ensure transparency, accountability, data privacy, and responsible AI implementation.
- Encourage government support initiatives, including infrastructure assistance and SME-focused digital capacity-building programs.

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