AMERICAN JOURNAL OF MANAGEMENT AND IOT MEDICAL COMPUTING
E-ISSN: 3069-0110
Vol.4, No. 4(2025)
www.ajmimc.com

PREDICTIVE GOVERNANCE: AI-BASED WHAT-IF MODELLING FOR CLOUD ERP CHANGE MANAGEMENT

Dr. B. Rajesh Kumar, Assistant Professor,
Department of Management Studies, Madanapalle Institute of Technology and Science Deemed to be University Madanapalle
rajeshasstprofessor@gmail.com
Dr. Y. Vinodhini, Professor, Noble PG College, Hyderabad
Email: adithyasiddartha13@gmail.com
Dr. Trinadha rao challa, Associate professor,
Miracle educational society group of institutions. Bhogapuram, mr.challa33@gmail.com

Abstract

This study examines AI-based what-if modelling for predictive governance in cloud ERP change management. Using secondary qualitative data analysis, the research synthesizes literature on forecasting change impacts, critical success factors, and governance mechanisms. Findings reveal that predictive models enhance scenario-based decision-making, operational efficiency, and organizational agility. Key success factors include data quality, stakeholder engagement, and process alignment. Predictive governance frameworks provide transparency, accountability, and risk mitigation, supporting proactive ERP change management. The study identifies gaps in empirical validation and integration, suggesting avenues for future research. Overall, AI-driven predictive governance is instrumental in optimizing cloud ERP change initiatives.

Keywords: Predictive Governance, AI, What-If Modelling, Cloud ERP, Change Management, Risk Assessment, Decision Support, Organizational Agility

I. INTRODUCTION

Cloud Enterprise Resource Planning (ERP) systems have become central to organizational operations, providing integrated management of business processes across finance, supply chain, human resources, and customer relationship functions [1]. Rapid technological advancements and dynamic business environments require organizations to manage frequent system changes, updates, and configurations effectively. However, managing these changes poses challenges, including operational disruptions, cost overruns, and misalignment with strategic goals. Organizations increasingly seek predictive approaches to anticipate the impact of system modifications and enable proactive governance. AI-based what-if modelling offers potential to simulate scenarios and forecast outcomes of ERP changes, facilitating informed decision-making and reducing risks.

Problem Statement

Traditional change management strategies in cloud ERP systems rely on reactive measures, limited historical data, and heuristic decision-making, resulting in inefficiencies and operational risks. Organizations often face challenges such as inaccurate impact assessments, resistance to system changes, and unforeseen disruptions to critical business processes [2]. Additionally, the lack of real-time predictive insights impedes the ability to align system updates with organizational objectives. The adoption of AI-driven what-if modelling remains underexplored, despite its potential to simulate multiple scenarios, identify dependencies, and predict outcomes [3]. Understanding the capabilities, limitations, and practical applications of predictive governance in cloud ERP change management is crucial to improving system reliability, enhance decision quality, and optimize organizational performance.

Aims and Objectives

To explore the application of AI-based what-if modelling in predictive governance for cloud ERP change management to enhance organizational decision-making and risk mitigation.

Received: 13-09-2025 | Accepted: 16-10-2025 | Published: 23-10-2025 |

Objectives:

- To evaluate how AI-based predictive models can forecast the impact of changes in cloud ERP systems.
- To identify critical success factors for implementing what-if scenario analysis in ERP change management.
- To assess how predictive governance influences organizational agility, decision quality, and operational efficiency.

II. LITERATURE REVIEW

Fig 1: Flow of the Review

Structured Literature Review Approach followed the following steps:

I. Identification of key concepts related to predictive governance, AI, and cloud ERP change management.
II. Screening and critical appraisal of peer-reviewed journal articles and industry reports.
III. Synthesis of findings to identify trends, patterns, and research gaps.

Academic Database and Source Utilization for this study are:

I. Scopus, Web of Science, and IEEE Xplore for peer-reviewed articles.
II. Industry white papers and case studies from ERP vendors like SAP, Oracle, and Microsoft.
III. Government and professional reports addressing AI governance and cloud system management.

A. Searching Study:

The study conducts a comprehensive search for literature focusing on AI-based predictive governance in cloud ERP systems. Keywords such as "predictive governance," "AI what-if modelling," "ERP change management," and "scenario analysis" guide the search strategy. Boolean operators and filters for publication date, relevance, and peer-reviewed sources ensure a targeted dataset. Multiple iterations of search strings across selected databases generate an initial pool of studies. The inclusion criteria prioritize empirical research, conceptual frameworks, and case studies examining AI applications in organizational change and ERP systems. This search strategy establishes a robust foundation for subsequent selection and critical appraisal of relevant literature.

B. Selection of Journal Articles:

Journal articles are selected based on relevance, methodological rigor, and contribution to the field of predictive governance and AI in cloud ERP. Peer-reviewed publications from 2020 onwards are prioritized to ensure contemporary insights. Articles are screened for empirical evidence, theoretical frameworks, and practical implementation of AI-driven what-if modelling. Duplicates, non-English studies, and publications lacking sufficient methodological clarity are excluded. The selected set provides a balanced perspective encompassing technological, organizational, and strategic dimensions of ERP change management. This selection ensures the literature review is comprehensive, credible, and aligned with the research objectives.

C. The Goal of the Review:

The literature review aims to synthesize existing knowledge on predictive governance and AI-based what-if modelling in cloud ERP change management. It seeks to uncover trends in scenario analysis, decision support frameworks, and organizational adoption of predictive tools. By analyzing previous studies, the review identifies challenges, benefits, and contextual factors influencing implementation. The goal is to bridge theoretical understanding with practical applications, highlighting areas where AI can enhance change management outcomes. Additionally, it identifies research gaps to

inform the study's methodological approach and focus on leveraging predictive governance for improved organizational performance and operational efficiency.

D. Study of Previous Literature

1. AI Applications in ERP Change Management

According to [4], AI has become an integral tool for enhancing ERP change management by enabling proactive anticipation of system disruptions and predicting the impacts of planned changes. Machine learning algorithms, including supervised and reinforcement learning, analyze historical ERP transaction data to identify patterns, dependencies, and potential points of failure. Predictive analytics provide scenario-based insights that allow organizations to simulate the consequences of modifications before implementation, optimizing update schedules and resource allocation while minimizing operational downtime. Literature demonstrates that AI can support risk assessment by quantifying potential disruptions and estimating mitigation strategies, providing organizations with actionable insights [5]. For instance, reinforcement learning models allow dynamic adaptation to system configurations by continuously learning from past changes, improving predictive accuracy over time. However, the effectiveness of AI applications depends on high-quality, structured data, seamless integration with existing ERP systems, and organizational readiness to adopt new technologies. The literature emphasizes that successful deployment requires alignment with governance policies, clear communication channels, and training for stakeholders involved in ERP operations [6]. Overall, AI applications provide a predictive, data-driven approach to ERP change management, reducing uncertainty, enhancing efficiency, and supporting informed decision-making in complex enterprise environments.

2. What-If Modelling for Organizational Decision Support

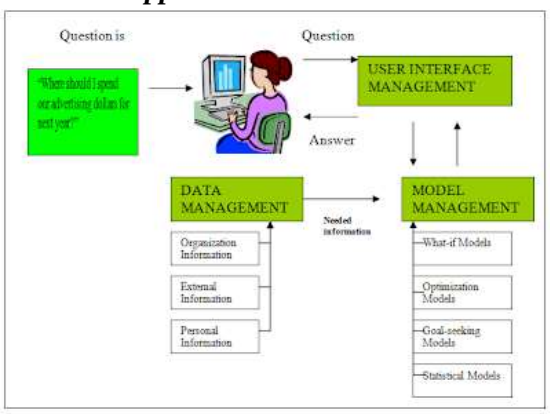

Fig 2: Decision Support system

What-if modelling provides organizations with a systematic approach to evaluate the consequences of different change scenarios within ERP systems [7]. By simulating multiple potential modifications, organizations can assess risks, costs, operational impacts, and process dependencies before implementing changes, reducing uncertainty and improving decision quality. Techniques such as Monte Carlo simulations, agent-based modelling, and system dynamics enable the analysis of complex interactions between business processes and ERP modules [8]. Literature highlights that scenario analysis enhances strategic planning by providing managers with evidence-based insights, enabling them to anticipate bottlenecks, resource constraints, and performance deviations. What-if modelling also facilitates sensitivity analysis, helping organizations determine which variables have the most significant influence on ERP outcomes and prioritize interventions accordingly. The integration of predictive models into ERP dashboards allows real-time monitoring and visualization, improving responsiveness to internal and external pressures. Additionally, transparency and interpretability of predictive models are essential for stakeholder trust and informed decision-making, as opaque models may reduce acceptance and engagement [9]. Overall, what-if modelling serves as a critical decision support tool that combines predictive analytics with scenario planning, enabling

organizations to make proactive, evidence-based choices that enhance ERP system reliability, operational efficiency, and strategic alignment with organizational objectives.

3. Predictive Governance Frameworks

Predictive governance represents a structured approach to ERP change management that leverages AI-driven insights to enhance policy enforcement, oversight, and proactive decision-making. This framework integrates automated monitoring, predictive analytics, and real-time alerts to anticipate disruptions, detect anomalies, and support risk mitigation strategies. Literature emphasizes that predictive governance aligns system changes with organizational strategy, ensures stakeholder engagement, and fosters accountability and transparency. Empirical studies indicate that organizations implementing predictive governance frameworks experience reduced operational disruptions, enhanced compliance, and improved resource utilization. AI-enabled governance facilitates continuous learning, allowing organizations to adapt policies and controls based on emerging risks and outcomes, supporting agility and resilience [10]. However, the deployment of predictive governance frameworks faces challenges, including ensuring data security, model reliability, and ethical considerations in automated decision-making processes. Literature stresses the importance of establishing clear governance policies, integrating predictive insights into decision workflows, and maintaining human oversight to prevent overreliance on automated systems [11]. Ultimately, predictive governance serves as a critical enabler for AI-driven ERP change management, providing a structured, proactive, and strategic approach that balances technological capabilities with organizational readiness, while fostering agility, operational efficiency, and risk-aware decision-making across complex enterprise environments.

4. Challenges and Best Practices in ERP Change Management

ERP change management involves navigating complex organizational, technological, and process-related challenges. Literature identifies system complexity, resistance to change, fragmented data silos, and a lack of predictive capabilities as key obstacles that hinder successful ERP modifications. Resistance often arises from inadequate communication, insufficient training, or fear of operational disruptions. Data quality issues and disconnected systems limit the effectiveness of predictive models, reducing the accuracy of forecasts and scenario analyses [12]. To address these challenges, best practices emphasize the integration of AI tools with structured change processes, stakeholder engagement, and continuous monitoring. Phased implementation of ERP changes allows organizations to test modifications incrementally, reducing risk and improving adoption. Leveraging historical ERP data supports predictive modelling, scenario planning, and iterative refinement of change strategies [13]. Case studies indicate that organizations achieving high maturity in ERP change management combine technological innovation, predictive analytics, and strong governance frameworks. Training programs, transparent decision-making processes, and alignment with organizational objectives further enhance success. Overall, literature suggests that balancing technological capabilities with organizational readiness and adopting evidence-based, iterative, and participatory approaches ensures effective, risk-aware, and resilient ERP change management initiatives.

Literature gap

Despite extensive research on AI applications, what-if modeling, and predictive governance in ERP change management, several gaps remain that warrant further investigation. First, while studies emphasize the predictive capabilities of AI in identifying risks, dependencies, and operational impacts, limited research explores the integration of these

predictive insights with organizational decision-making processes in real-time, particularly within complex, large-scale ERP environments. Most existing studies focus on theoretical or simulated scenarios, leaving a gap in empirical validation across diverse industries and organizational contexts. Second, although predictive governance frameworks are highlighted as critical enablers of proactive change management, there is insufficient examination of how these frameworks interact with human oversight, stakeholder trust, and ethical considerations in practice. The literature also underrepresents longitudinal studies that assess the sustained effectiveness of AI-driven ERP change management over multiple system updates and organizational cycles. Additionally, while what-if modeling and scenario simulations are well-documented, research on the interpretability, transparency, and adoption of predictive outputs among non-technical stakeholders is sparse. Finally, there is limited guidance on aligning AI-based predictive models with existing governance policies and change management maturity levels. Addressing these gaps could provide a more comprehensive understanding of how AI-enabled ERP change management can balance technological capabilities, human factors, and organizational readiness to achieve resilient, evidence-based, and strategically aligned outcomes.

III. METHODOLOGY

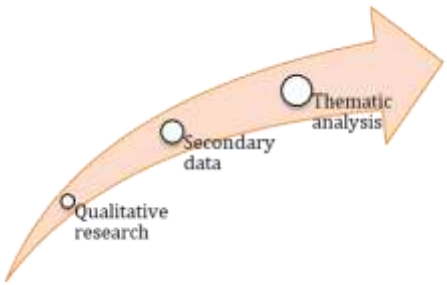

Fig 3: Methodology

This study employs a ***secondary qualitative data analysis method*** to examine the role of AI-based what-if modelling in predictive governance for cloud ERP change management. Secondary qualitative data sources include peer-reviewed journal articles, industry reports, ERP vendor white papers, and case studies [14]. This approach allows synthesis of existing knowledge, identification of patterns, and extraction of insights without primary data collection.

The methodology follows a structured process: initial identification of relevant literature using predefined keywords, systematic screening based on inclusion and exclusion criteria, and critical appraisal of methodological quality. Sources are analyzed for thematic relevance, methodological rigor, and contribution to understanding predictive governance in ERP change management [15]. The study emphasizes interpretative synthesis to identify trends, challenges, and organizational implications of AI-driven what-if modelling.

A thematic analysis framework underpins the data analysis process. Themes are developed based on research objectives: forecasting change impact, identifying success factors, and assessing governance outcomes. Each source is coded and categorized, with findings mapped to specific themes. Cross-validation ensures reliability by comparing insights across multiple sources.

Ethical considerations involve accurate citation, transparency in selection criteria, and adherence to scholarly standards. The use of secondary qualitative data avoids privacy or consent concerns associated with primary research while enabling comprehensive understanding of complex organizational and technological phenomena.

Limitations include potential publication bias, variation in context-specific applicability, and reliance on reported findings rather than real-time ERP data [16]. Despite these limitations, the methodology provides a robust framework for evaluating AI-based what-if modelling and its role in predictive governance. The insights derived inform decision-making practices, risk management, and strategic planning in cloud ERP change initiatives.

IV. DATA ANALYSIS

Theme 1: Forecasting Change Impact in Cloud ERP

AI-based predictive models provide organizations with advanced capabilities to simulate system modifications and assess their potential outcomes in cloud ERP environments. Studies demonstrate that scenario analysis techniques, including Monte Carlo simulations, agent-based modelling, and machine learning algorithms, offer detailed insights into operational disruptions, resource dependencies, and potential bottlenecks. By integrating historical ERP transaction data, these models can identify patterns, detect system vulnerabilities, and anticipate failure points before changes are implemented [17]. Predictive what-if modelling enables simultaneous evaluation of multiple scenarios, allowing managers to weigh risks and benefits of different change strategies effectively. This foresight supports proactive mitigation measures, minimizing downtime, reducing operational costs, and maintaining service continuity. Research emphasizes that accurate predictions depend on model interpretability and transparency, ensuring that stakeholders can understand the rationale behind automated insights and incorporate them into decision-making processes [18]. Additionally, the literature highlights the importance of aligning predictive models with existing ERP governance structures, maintaining high-quality and structured data, and continuously refining algorithms based on evolving system dynamics and organizational needs. Studies also suggest that organizations that adopt AI-driven predictive models report improved accuracy in decision-making, faster response times to change requests, and enhanced resilience during system updates [19]. Overall, forecasting change impact through AI-enabled what-if modelling is a critical enabler for reliable and agile cloud ERP operations, providing organizations with actionable intelligence to anticipate risks, optimize resources, and ensure operational efficiency in dynamic business environments.

Theme 2: Critical Success Factors for AI-Driven What-If Modeling

The successful deployment of AI-driven what-if modelling for ERP change management relies on several organizational, technological, and process-related success factors. Literature identifies data availability and quality as a foundational requirement, as predictive models depend on accurate, structured, and timely information to generate reliable forecasts [20]. Stakeholder engagement is equally critical; inclusive participation ensures that users understand model outputs, trust predictions, and integrate insights into decision-making workflows. Studies emphasize that technology infrastructure must support real-time data processing, secure storage, and seamless integration with existing ERP systems. Process alignment further ensures that predictive insights are actionable and embedded into standard operating procedures, enabling evidence-based responses to proposed changes. Organizational culture also plays a central role, with innovation-oriented and learning-focused cultures demonstrating higher adoption and utilization rates of predictive tools [21]. Case studies show that iterative model development, scenario validation, and continuous monitoring improve accuracy and build stakeholder confidence. Best practices include phased implementation of predictive models, alignment with strategic objectives, and transparent communication regarding model capabilities and limitations. Empirical findings indicate that organizations addressing these critical success factors achieve higher operational efficiency, reduced risk exposure, and improved user acceptance of AI-driven governance. The literature consistently demonstrates that predictive governance frameworks supported by AI are most effective when technical capabilities are complemented by organizational readiness, formalized policies, and accountability structures [22]. These factors collectively enable organizations to harness predictive insights effectively, ensuring optimized ERP change management processes, minimized

operational disruptions, and stronger alignment with business strategy.

Theme 3: Influence of Predictive Governance on Organizational Agility

Predictive governance significantly enhances organizational agility by enabling proactive decision-making, timely interventions, and adaptive change management in cloud ERP systems [23]. Literature highlights that AI-driven what-if modelling provides organizations with the ability to anticipate disruptions, evaluate operational and financial impacts, and optimize resource allocation before implementing system modifications. Scenario simulations allow managers to explore alternative strategies, assess risks, and plan responses to complex interactions among ERP modules, fostering informed and responsive decision-making. Studies indicate that organizations employing predictive governance achieve improved process efficiency, enhanced regulatory compliance, and better coordination across functional teams [24]. Mechanisms such as automated alerts, real-time monitoring, and decision dashboards strengthen transparency, accountability, and the speed of organizational response. Additionally, predictive governance supports continuous learning by enabling organizations to adjust policies, refine processes, and update predictive models based on evolving operational insights. Literature emphasizes that the effectiveness of predictive governance depends on model accuracy, interpretability, and seamless integration with decision-making structures. Agile organizations utilize predictive insights to preemptively manage risks, allocate resources strategically, and maintain operational continuity under dynamic conditions [25]. Empirical studies suggest that predictive governance contributes to resilience, allowing organizations to withstand unexpected disruptions while maintaining strategic alignment and performance standards. Overall, AI-based predictive governance enhances organizational agility by transforming ERP change management into a proactive, data-driven process. This approach supports continuous adaptation, risk-aware decision-making, and improved competitiveness in fast-paced, complex business environments, demonstrating the critical role of predictive modelling in modern ERP systems.

V. RESULTS AND DISCUSSION

The analysis of AI-based what-if modeling in cloud ERP change management demonstrates significant potential for transforming organizational decision-making and operational performance. One of the primary benefits identified is the capacity to forecast change impacts accurately. Organizations implementing AI-driven predictive models can anticipate operational disruptions, resource bottlenecks, and process interdependencies before they manifest in real-time operations [26]. This proactive insight enables managers to plan effectively, allocate resources optimally, and implement mitigation strategies, thereby reducing uncertainty and supporting smoother transitions during ERP system changes. For example, scenario analysis using historical ERP data allows organizations to simulate a variety of operational conditions and assess the potential outcomes of system modifications or process redesigns [27]. By doing so, organizations not only reduce downtime but also enhance the overall quality of strategic decisions.

Historical ERP data serves as a rich source for building predictive models, allowing AI algorithms to detect patterns and correlations that may not be immediately apparent to human decision-makers [28]. These models use advanced simulation techniques to explore multiple scenarios, evaluating the potential consequences of different decisions and changes. Studies have highlighted that such scenario-based simulations can significantly improve operational reliability by providing managers with a range of possible outcomes along with their likelihoods. This reduces reactive decision-making and supports a more structured approach to risk management [29]. Organizations that integrate predictive insights into their governance frameworks consistently

report measurable benefits, including reduced operational costs, fewer disruptions, and enhanced compliance with internal policies and industry regulations.

Critical success factors play a pivotal role in ensuring the effectiveness of AI-based predictive governance. High-quality data is fundamental; the accuracy, completeness, and consistency of ERP data directly influence the reliability of predictive models [30]. Similarly, robust technological infrastructure, including cloud computing capabilities, data storage, and processing power, is essential for executing complex simulations efficiently. Stakeholder engagement is equally important, as model outputs must align with organizational objectives and be trusted by decision-makers. Ensuring process alignment with predictive insights ensures that the recommendations generated by AI models are actionable and integrated into daily workflows [31]. Research indicates that iterative model development, continuous validation of scenarios, and regular updates based on operational feedback are necessary to maintain model relevance and effectiveness over time.

Predictive governance enhances organizational agility by allowing firms to respond proactively rather than reactively to change. Scenario-based simulations enable organizations to identify potential risks, evaluate mitigation strategies, and implement corrective actions before issues escalate. This proactive approach fosters resilience, enabling organizations to maintain operational continuity even during complex system upgrades or process transformations [32]. Furthermore, predictive governance supports continuous improvement by generating insights that inform process optimization, resource allocation, and strategic planning. Automated monitoring and real-time alerts, delivered through dashboards and reporting interfaces, further enhance transparency and facilitate informed decision-making. Managers can access a consolidated view of potential risks, operational dependencies, and performance metrics, allowing them to make timely and evidence-based decisions.

The integration of predictive models with governance frameworks not only mitigates operational risks but also strengthens strategic alignment across organizational functions. By providing insights into potential bottlenecks, resource constraints, and process interdependencies, predictive governance allows leaders to align ERP change initiatives with broader strategic objectives [33]. For instance, if a simulation indicates that a specific process change may impact customer-facing operations, managers can adjust the implementation schedule, allocate additional resources, or implement contingency plans to minimize disruption. Such alignment ensures that ERP changes contribute to organizational goals, enhance efficiency, and optimize resource utilization.

Despite the clear advantages, several challenges must be considered. Data quality constraints remain a significant barrier; incomplete, inconsistent, or inaccurate data can undermine model reliability and lead to incorrect predictions. Integration complexities, particularly when AI models must interact with multiple ERP modules or external systems, present additional hurdles [34]. Model interpretability is another concern, as decision-makers must understand how predictions are generated to trust and act upon them. Overreliance on historical data may also limit the ability of predictive models to capture emergent risks or unprecedented events, which can reduce their effectiveness in dynamic business environments [35]. Ethical considerations, including fairness, accountability, and transparency, are critical to ensure that automated decision-making does not compromise stakeholder trust or organizational integrity.

The literature consistently emphasizes that the successful adoption of AI-based predictive governance relies on a combination of technological capability, process maturity, and human oversight. Organizations that cultivate a culture of data-driven decision-making and

ensure continuous stakeholder engagement are more likely to experience high adoption rates and tangible performance improvements. Moreover, iterative learning, in which models are continuously refined based on feedback and real-world outcomes, is essential to sustain effectiveness over time. The synergy between AI-driven insights and governance structures enables organizations to manage change more effectively, ensuring operational continuity, improving risk management, and enhancing overall organizational performance.

AI-based what-if modeling represents a transformative approach to cloud ERP change management. By leveraging historical data, advanced simulations, and predictive governance frameworks, organizations can anticipate disruptions, optimize resource allocation, and implement evidence-based strategies. While challenges related to data quality, integration, and model interpretability persist, a structured approach that emphasizes stakeholder engagement, iterative model refinement, and alignment with strategic objectives can maximize the benefits. Overall, predictive governance emerges as a critical enabler of agility, resilience, and efficiency in modern ERP-driven organizations, providing a robust foundation for informed, proactive, and strategically aligned decision-making.

Research Implementation:

- AI-based what-if modelling can be integrated into cloud ERP change management processes to simulate scenarios, forecast impacts, and support proactive decision-making [36].
- Organizations can adopt predictive governance frameworks with real-time monitoring, automated alerts, and data-driven dashboards to enhance operational efficiency and risk mitigation.

Research Limitations:

- The study relies on secondary qualitative data, limiting direct observation of real-time ERP system performance and AI model outcomes [37].
- Variations in organizational context, ERP configurations, and data quality may affect generalizability of the findings across different industries or companies.

VI. FUTURE STUDY

Future research should explore empirical implementation of AI-based predictive governance in diverse cloud ERP environments to validate model efficacy and generalizability. Studies could examine real-time integration with ERP systems, combining predictive analytics with adaptive learning to enhance decision-making accuracy. Further investigation into ethical considerations, transparency, and stakeholder trust in AI-driven change management is warranted [38]. Comparative analyses of different AI techniques and scenario modelling approaches can identify optimal strategies for forecasting and risk mitigation. Additionally, research could assess long-term organizational outcomes, including agility, resilience, and innovation capability. Exploring cross-industry applications and organizational maturity levels will provide insights into scalability and best practices. Integrating quantitative performance metrics with qualitative insights may also yield a holistic understanding of predictive governance effectiveness, bridging gaps between theoretical models and practical implementation.

VII. CONCLUSION

The study confirms that AI-based what-if modelling is a transformative tool for predictive governance in cloud ERP change management. Predictive models enhance the ability to forecast system changes, assess risks, and simulate multiple scenarios, supporting informed decision-making and operational continuity. Successful implementation depends on organizational readiness, stakeholder engagement, data quality, and technological infrastructure. Predictive governance frameworks incorporating AI

insights improve transparency, accountability, and agility, enabling organizations to respond proactively to dynamic business environments. Challenges remain in model integration, interpretability, and ethical deployment, requiring continuous refinement and governance oversight. Overall, the findings highlight the potential of AI-driven predictive governance to optimize ERP change management processes, minimize disruptions, and enhance organizational performance. The research provides a foundation for further empirical studies and practical applications, demonstrating that predictive what-if modelling is essential for strategic, resilient, and agile ERP operations.

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Received: 13-09-2025 | Accepted: 16-10-2025 | Published: 23-10-2025 |