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FP&A In Manufacturing: The Role Of AI In Maximizing P&L Impact

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Abstract
This study investigates the impact of Artificial Intelligence (AI) on Financial Planning and Analysis (FP&A) in the manufacturing industry, focusing on its ability to maximize Profit and Loss Statement (P&L) outcomes. The research is justified by the increasing operational complexity of the sector and the need to integrate advanced technologies to overcome challenges such as data fragmentation and economic volatility. The main objective was to analyze how AI can transform FP&A by promoting operational efficiency, analytical precision, and financial resilience. The methodology adopted was qualitative and exploratory, based on case studies and literature review. Results indicate that AI optimizes financial processes through automation, predictive analysis, and data integration, enabling scenario anticipation and cost reduction. Furthermore, technologies such as machine learning and IoT have revolutionized cost and revenue management, leading to significant improvements in P&L. It is concluded that AI is a strategic element for companies in the sector, redefining financial practices and positioning them competitively in the global market. Future studies may explore the practical application of AI in different industrial contexts.

Key Word*: Artificial Intelligence, FP&A, Manufacturing Industry, P&L, Automation, Predictive Analysis.*

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I. Introduction

Financial Planning and Analysis (FP&A) play a strategic role in the management of contemporary organizations, especially in sectors like manufacturing, which faces significant challenges related to economic volatility, supply chain disruptions, and pressure for operational efficiency. In this context, the integration of advanced technologies, such as Artificial Intelligence (AI), has consolidated itself as a promising approach to transform financial processes and maximize impact on the Profit and Loss Statement (P&L). According to Lemos et al. (2021), robust FP&A practices not only optimize resource allocation but also increase companies' ability to respond to rapid market changes, which is essential in a globalized and competitive environment.

AI has revolutionized FP&A by introducing advanced analytical tools, such as machine learning and natural language processing, which enable more accurate predictive and prescriptive analyses. These technologies are capable of identifying complex patterns in large volumes of data, reducing uncertainty, and improving strategic decision-making (Finance Alliance, 2021). In the manufacturing sector, where operational complexity is high, the application of AI has the potential to solve structural problems, such as data fragmentation and budget rigidity, promoting greater efficiency and financial resilience (Assetz, 2023).

The central question guiding this study is: how can the application of Artificial Intelligence in FP&A maximize impact on the P&L in the manufacturing industry? The relevance of this investigation lies in the need to explore how emerging technologies can be practically applied to overcome the challenges faced by companies in the sector. As highlighted by Duarte and Lemos (2024), AI not only automates repetitive processes but also redefines the way organizations manage revenues and costs, creating synergies that drive competitiveness.

This study is justified by the growing adoption of AI in the corporate environment and the existing gap in the literature regarding its specific application in FP&A in the manufacturing industry. While previous studies have explored the impact of AI in areas such as supply chain and production, there is a need to understand how these technologies can be integrated into financial processes to generate strategic value. According to Francisco (2025), the successful integration of AI in FP&A depends on factors such as organizational culture, system interoperability, and the ability to adapt predictive models to dynamic scenarios.

The overall objective of this article is to analyze the role of Artificial Intelligence in maximizing impact on the P&L through FP&A in the manufacturing industry. The specific objectives include: a) Identifying the main challenges faced by manufacturing companies in implementing AI in FP&A; b) Exploring the most used AI technologies in the context of FP&A and their strategic benefits; and c) Evaluating the impact of AI on operational efficiency and financial decision-making.

II. Theorical Framework

The Role of FP&A in Manufacturing

Financial Planning & Analysis (FP&A) emerges as a central pillar in the strategic structuring of contemporary organizations, acting as an integrative mechanism between financial management and corporate objectives. Its definition, as highlighted in the literature, transcends the mere preparation of budgets, encompassing continuous analytical processes that support decision-making based on both quantitative and qualitative data. In this sense, FP&A is configured as an element that harmonizes financial planning, scenario forecasting, and performance analysis, aiming to optimize resource allocation and mitigate operational risks (Gimenez, 2019).

The conceptual delimitation of FP&A often intertwines with discussions on financial literacy, although both dimensions occupy distinct spaces. While financial literacy refers to the ability of individuals and organizations to understand and apply basic economic principles (Francescatto, Palma, and Roos, 2020), FP&A is situated in a more technical realm, requiring specialized skills in financial modeling, interpretation of metrics, and long-term projections. This distinction is crucial to avoid theoretical reductions, as FP&A is not limited to financial education but implies the construction of systems capable of translating data into strategic insights (Mendes, Sacamano, and Fusco, 2006).

The importance of FP&A lies in its ability to convert fragmented information into cohesive narratives, essential for organizational sustainability. According to Lemos et al. (2021), companies that implement robust FP&A practices experience significant improvements in cash flow, the identification of investment opportunities, and adaptation to market volatilities.

From a strategic point of view, FP&A serves as a nexus between financial departments and executive leadership, ensuring that decisions are based on concrete evidence. Reports from the Finance Career Perspective Yearbook (2023) highlight that FP&A professionals are increasingly involved in discussions on mergers, acquisitions, and international expansions, signaling an evolution of the traditionally associated role. This expanded scope requires mastery of advanced analytical tools, such as big data and artificial intelligence, which enable precise simulations of different economic realities (ASSETZ, 2023).

Within the context of the manufacturing sector, the adoption of FP&A faces structural challenges that reflect the operational complexity and inherent volatility of the segment. According to Assetz (2023), one of the central challenges lies in economic volatility, exacerbated by geopolitical crises and supply chain disruptions. Studies show that manufacturing companies faced a cumulative deficit of US$125 billion in 2022 due to high energy costs and logistical interruptions. This instability complicates the creation of realistic budgets, forcing FP&A professionals to develop dynamic models capable of incorporating unpredictable variables, such as tariff changes or raw material shortages. The literature emphasizes that the inability to anticipate these scenarios results in misalignments between projections and execution, generating excessive operational costs and loss of profit margins.

At the same time, the dependence on manual and fragmented processes persists as a barrier, as although technological solutions in FP&A promise to minimize errors and expedite analysis, many industries maintain legacy systems based on spreadsheets, limiting data integration between production, logistics, and finance. This disconnection leads to duplication of information and delays in report consolidation, slowing decision-making in contexts where speed is crucial. For example, demand forecasting models often fail to synchronize sales data with production capacity indicators, resulting in oversized inventories or supply chain disruptions (Randstad, 2021).

The adoption of real-time analytics tools emerges as another critical challenge, although essential for the modernization of FP&A. Research such as Francisco (2025) identifies a gap between the availability of advanced technologies (like big data and AI) and their practical application on the shop floor. Companies implementing predictive analytics platforms face cultural resistance, in addition to technical difficulties in harmonizing heterogeneous data (such as operational efficiency metrics and key performance indicators) into unified dashboards. This technological lag not only reduces the accuracy of simulations but also limits the ability to make real-time adjustments in response to market changes.

Another point of tension involves managing multiple scenarios and flexible budgets. While theory recommends developing at least three scenarios (optimistic, base, and pessimistic) to navigate uncertain environments, practice reveals that many organizations still adopt static approaches, fixed on outdated assumptions after health crises or energy transitions. Budget rigidity becomes particularly problematic in sectors with long production cycles, such as automotive or aerospace, where changes in global demand can invalidate projections made months before (Francisco, 2025).

Artificial Intelligence in Finance

The integration of Artificial Intelligence (AI) into Financial Planning and Analysis (FP&A) reconfigures traditional management models, introducing systems capable of converting raw data into strategies

guided by insights with analytical rigor and operational efficiency. Recent studies show that AI acts not as an isolated tool, but as a synergistic set of interconnected technologies that amplify predictive analytics, agile decision-making, and organizational adaptability in dynamic scenarios. These innovations transcend the limitations of conventional statistical models, offering a holistic approach that integrates quantitative and qualitative variables to optimize financial planning (FPA Trends, 2021).

Machine learning becomes a central element in this transformation, enabling the decoding of non-linear patterns in massive datasets, both historical and in continuous flow. Advanced regression algorithms and artificial neural networks are calibrated to design critical variables (such as sectoral revenues and exchange rate fluctuations), considering interdependencies between heterogeneous factors, such as climatic events and supply contracts. The literature highlights the ability of these models to self-recalibrate by assimilating new data, thus reducing the time lag between changes in the economic environment and the update of corporate scenarios (Finance Alliance, 2021).

At the same time, Natural Language Processing (NLP) redefines the analysis of unstructured documents, such as executive minutes and market reports, using sentiment analysis techniques to quantify discursive nuances that signal latent risks or strategic opportunities. Leading companies apply this technology to automate the extraction of critical contractual clauses, synchronizing legal obligations with financial projections in real-time. Digital twins emerge as virtual simulators capable of reproducing organizational financial systems, allowing proactive evaluation of decisions such as mergers or pricing adjustments across multiple scenarios. By integrating operational data (production capacity) and macroeconomic data (inflation indices), these models identify vulnerabilities and test mitigation strategies before practical implementation (Datarails, 2023).

Finally, prescriptive analytics goes beyond statistical forecasting, offering strategic recommendations based on mathematical optimization and game theory. By synthesizing historical data, logistical constraints, and corporate goals, these systems propose actions such as budget reallocation or renegotiation of supplier deadlines, balancing operational efficiency and financial resilience. This approach requires interoperability with management systems for continuous updating of metrics such as liquidity and exposure to systemic risks (Datarails, 2023; Finance Alliance, 2021).

Impact on P&L

Artificial Intelligence (AI) consolidates itself as a transformative catalyst in contemporary financial management, acting simultaneously as a lever for revenue maximization and as a strategic tool for cost containment. Recent literature highlights that this dual functionality arises from AI's ability to integrate predictive analytics, advanced automation, and process optimization in complex business ecosystems. According to Duarte and Lemos (2024), by transcending traditional approaches, which often treat revenues and costs as isolated dimensions, AI establishes an operational synergy that redefines the parameters of organizational efficiency.

In the realm of revenue optimization, AI operates through sophisticated mechanisms of personalization and price dynamics. Machine learning algorithms analyze consumption patterns, customer behaviors, and market variables in real-time, allowing precise tariff adjustments that maximize profitability without compromising competitiveness. Retail companies, for example, use AI-based systems to segment offers according to consumers' socio-economic profiles, increasing conversion rates by up to 35% compared to static strategies. Complementarily, predictive models identify demand trends before they manifest macroscopically, enabling inventory anticipation and strategic allocation of production resources. This ability to "predict the near future" reduces the risk of product obsolescence and increases net revenue in sectors with short product life cycles, such as technology and fashion (Kaufman, 2022; Albuquerque and Duarte, 2024).

AI also revolutionizes the management of recurring revenues in subscription-based business models. By analyzing churn rates and usage patterns, intelligent systems identify customers at risk of cancellation and propose personalized interventions (such as temporary discounts or service upgrades) that increase retention by an average of 22%. Additionally, prescriptive algorithms suggest optimal combinations of plans and packages, balancing commercial attractiveness and profit margins. In the telecommunications sector, this approach allowed companies to adjust mobile data offers based on users' historical consumption, increasing average revenue per user (ARPU) by 18% without increasing operational costs (Lee, 2019; Almeida, 2021).

In the cost reduction sphere, AI stands out for its intelligent automation of repetitive processes and resource optimization. Robotic Process Automation (RPA) robots, equipped with cognitive capabilities, perform tasks such as accounting reconciliation, invoice issuance, and inventory control with greater than 98% accuracy, reducing human errors and rework costs by up to 45%. In the manufacturing industry, the application of AI in supply chain management reduced raw material waste by 30% through precise demand forecasting and real-time adjustments in input orders. Additionally, predictive maintenance systems based on IoT sensors and neural networks reduced unplanned downtime by 60%, optimizing equipment utilization and extending its useful life (Albuquerque and Duarte, 2024).

The optimization of logistical costs illustrates another relevant facet. Delivery routes are dynamically recalibrated by algorithms that consider real-time traffic, weather conditions, and vehicle restrictions, reducing fuel costs by up to 25%. In e-commerce, AI platforms redistribute inventories between distribution centers based on regional demand forecasts, cutting freight expenses by 18% and improving delivery times. Such gains are amplified by integration with digital twins, which simulate operational scenarios to identify hidden bottlenecks and propose structural adjustments before physical implementation (Albuquerque and Duarte, 2024).

The literature also emphasizes AI's role in streamlining indirect costs. Automated contract analysis tools identify unfavorable clauses, unwanted automatic renewals, and renegotiation opportunities, generating average savings of 12% in legal and administrative expenses. In energy management, intelligent systems adjust consumption during peak tariff hours and optimize the use of renewable sources, achieving reductions of 20% to 40% in utility bills. Even areas like HR benefit from algorithms that predict employee turnover, enabling targeted retention programs that reduce recruitment and training costs by up to 30% (Almeida, 2021).

III. Methodology

The methodology adopted in this study was structured based on a qualitative and exploratory approach, aiming to investigate the impact of Artificial Intelligence (AI) on Financial Planning and Analysis (FP&A) in the manufacturing industry and its influence on maximizing the impact on the Profit and Loss Statement (P&L). The research followed a descriptive design, seeking to understand the phenomena related to AI integration in FP&A and to identify the challenges and benefits associated with this practice. This study is characterized as qualitative research with an exploratory approach. According to Gil (2008), qualitative exploratory research is appropriate when aiming to deepen the understanding of a phenomenon that has not yet been extensively investigated, allowing the construction of new perspectives on the subject. The choice of this approach is justified by the need to understand the nuances of AI adoption in FP&A and its impact on the manufacturing industry.

The sample selection was carried out based on criteria of convenience and relevance, encompassing case studies of manufacturing sector companies that have already implemented AI technologies in their FP&A processes. Corporate reports, academic articles, published case studies, and secondary data available in reliable databases were analyzed. This approach enabled the collection of robust and diversified information, as recommended by Yin (2015).

Data were collected from secondary sources, including academic publications, corporate reports, white papers, and specialized journal articles. Additionally, case studies of the company Unilever, which integrated AI into its financial processes, were analyzed. According to Marconi and Lakatos (2017), the use of secondary sources is a valid strategy for analyzing phenomena in specific contexts, especially when the direct collection of primary data is unfeasible. Data analysis was conducted using content analysis techniques, as proposed by Bardin (2016). The collected data were categorized into key themes, such as "Impact of AI on P&L," "Challenges in Implementing AI in FP&A," and "Strategic Benefits of AI." This approach allowed for the identification of patterns and relationships among the studied variables, providing an integrated view of AI's impact on FP&A.

Although this study relied exclusively on secondary data, ethical guidelines recommended by the National Association of Graduate Studies and Research in Administration (ANPAD, 2020) were followed. All sources of information were properly cited, ensuring the transparency and academic integrity of the work. Among the study's limitations, the dependence on secondary data stands out, which restricts the possibility of exploring specific variables that could be obtained through interviews or direct observations. Furthermore, the rapid technological evolution in the field of AI may limit the generalization of the results to future contexts, as discussed by Fortes (2023).

IV. Results And Discussions

Organizational Context of Unilever

Unilever stands out as one of the most emblematic multinationals in the consumer goods sector, with a geographic presence spanning over 190 countries and a diverse portfolio that includes leading brands in food, personal care, and cleaning products. Its global operations reflect not only an aggressive expansion strategy but also continuous adaptation to the cultural, regulatory, and economic nuances of each market. As noted by Jones (2020), companies with such extensive operations face the dual challenge of maintaining consistency in their corporate identity while customizing offerings to meet local demands. In Unilever's case, this duality is evident in the harmonization of global brands such as Dove and Magnum with products developed exclusively for specific regions, such as fortified food lines for nutritionally deficient populations in Asia and Africa (Hope & Fraser, 2003).

The company's operational complexity is amplified by its multilayered supply chain, which integrates thousands of suppliers, distribution centers, and manufacturing units worldwide. As highlighted by Christopher

(2016), global supply chains require sophisticated logistics management to balance efficiency and resilience, especially in contexts of geopolitical volatility. Unilever, for instance, faced significant challenges during the container crisis in 2021 when disruptions in maritime shipping affected delivery times and costs. Additionally, the geographical dispersion of its factories necessitated investments in data integration technologies, such as ERP platforms, to monitor operations in real-time (Davenport & Harris, 2017).

Regarding its Financial Planning and Analysis (FP&A) structure, Unilever employs a hybrid model, combining regional and global teams to ensure strategic alignment of the Profit and Loss Statement (P&L). As argued by Hope & Fraser (2003), in multinational organizations, decentralizing financial functions to regional levels allows for agile responses to market variations, while central coordination ensures coherence in corporate goals. In practice, Unilever's regional teams are responsible for detailed budgets, incorporating variables such as local inflation, labor costs, and consumer preferences, while the global headquarters consolidates these data to set profitability targets and resource allocation strategies (Jones, 2020).

Implementation of AI in FP&A

The integration of Artificial Intelligence (AI) into Unilever's Financial Planning and Analysis (FP&A) marks a milestone in modernizing corporate practices, combining technological innovation with strategic goals for accuracy and agility. This move aligns with the global trend of adopting predictive tools to overcome the limitations of traditional models, as evidenced by the implementation of machine learning (ML) and natural language processing (NLP) platforms, as well as the integration of legacy systems with cloud-based architectures. These technologies not only optimized critical processes such as demand forecasting and cost management but also redefined the interaction between financial and operational data, establishing a paradigm of real-time insight-driven decision-making (Unilever, 2024).

In terms of adopted technologies, Unilever prioritized time-series algorithms for demand forecasting, enabling the company to anticipate market fluctuations with reduced margins of error. These models, trained on historical sales data, macroeconomic variables, and industry indicators, allowed for dynamic simulations that could incorporate disruptive events, such as geopolitical crises or regulatory changes. Simultaneously, NLP systems were deployed to analyze market reports, earnings call transcripts, and real-time news, extracting semantic patterns that influence investment and resource allocation decisions. This approach eliminated reliance on manual analyses, reducing the processing cycle for strategic information from weeks to hours (Unilever, 2023).

Integration with existing systems, particularly legacy ERPs such as SAP, required a hybrid architecture that connected on-premises databases to cloud-based solutions. This interoperability enabled the automated consolidation of financial information dispersed across regional units, harmonizing metrics such as gross margins, logistics costs, and product portfolio performance. The migration to cloud environments, in turn, facilitated the scalability of AI models, ensuring that algorithm updates could be implemented without disrupting critical operations. As a result, Unilever achieved a 40% reduction in the time dedicated to data integration between departments, as reported in corporate case studies (Aim Research, 2024).

Among the transformed processes, the automation of economic scenario simulations emerged as a pivotal advancement. ML models began generating multivariate budget projections, assessing, for example, the impact of trade sanctions on supply chains or cost sensitivity to exchange rate fluctuations. Previously limited to static analyses, these simulations gained dynamism by incorporating real-time data, such as inflation indices and commodity prices. During the 2024 energy crisis, the company leveraged these tools to recalibrate supply contracts, avoiding estimated over costs of $85 million feat attributed to the algorithms' ability to identify non-linear correlations between seemingly unrelated variables, such as oil prices and plastic packaging costs (Technology Magazine, 2025).

Cost management was also revolutionized by the deployment of IoT sensors in factories, which monitor logistics and energy expenses with unprecedented granularity. Devices connected to ML networks analyze electricity consumption patterns, machine efficiency, and distribution routes, generating predictive alerts for anomalies. In one documented instance, sensors detected a 12% increase in energy consumption at a plant in Indonesia, enabling early identification of a refrigeration equipment failure and preventing a potential loss of $2.3 million in perishable products (Technology Magazine, 2025).

Qualitative Impact on P&L

The integration of AI into Unilever's financial and operational processes has redefined qualitative paradigms in its Profit and Loss Statement (P&L), particularly in terms of process efficiency and strategic visibility. While these advances may not be directly quantifiable in traditional metrics such as EBITDA or net margin, they have significantly influenced the company's financial resilience, indirect cost optimization, and ability to navigate complex global scenarios (Unilever, 2025).

In terms of process efficiency, Unilever identified that repetitive activities consumed up to 23% of financial teams' time, according to internal estimates before AI implementation. The automation of these tasks through robotic process automation (RPA) and machine learning algorithms enabled the automated consolidation of financial data dispersed across regional ERPs, reducing human errors by 78% and accelerating the financial closing cycle from 12 to 5 business days. A notable case occurred in the ice cream division, where IoT sensors in factories were integrated with AI platforms to monitor real-time energy costs. This eliminated the need for manual adjustments of costs in spreadsheets, a process that previously required 40 hours per month per production unit. These gains went beyond mere time savings, qualitatively impacting the P&L by freeing intellectual capital for strategic analyses, such as evaluating sustainability investments or renegotiating contracts with critical suppliers (Unilever, 2024).

Strategic visibility, in turn, emerged as a competitive differentiator. During the 2024 raw material shortage in Asia, Unilever used predictive models trained on historical supply chain data, climate indicators, and real-time news to anticipate bottlenecks. These systems identified, six weeks in advance, risks of palm oil shortages in Indonesia, allowing for supplier diversification in West Africa and restructuring of financial hedging contracts. As a result, the company avoided an estimated 4.2% reduction in gross margins for its personal care product line, as reported in post-crisis analysis. This predictive capability not only protected the P&L from external shocks but also reinforced investor confidence, positioning Unilever as an entity capable of transforming global uncertainties into operational advantages (Supply Chain Dive, 2025; Cleverence, 2021).

V. Conclusion

The integration of Artificial Intelligence (AI) into Financial Planning and Analysis (FP&A) processes in manufacturing represents a paradigm shift with profound impacts on maximizing the Profit and Loss Statement (P&L). This study has demonstrated that the application of AI-based technologies, such as machine learning, natural language processing (NLP), and predictive analytics, not only optimizes operational efficiency but also redefines strategic decision-making in a sector characterized by high complexity and volatility. Throughout the research, it became evident that AI serves as a catalyst in overcoming structural challenges faced by the manufacturing industry, such as data fragmentation, budget rigidity, and difficulties in forecasting dynamic economic scenarios.

By processing large volumes of data and identifying complex patterns, AI provides strategic insights that enable more efficient resource allocation and more agile management of costs and revenues. Additionally, the adoption of predictive and prescriptive technologies has allowed companies to anticipate market fluctuations, mitigate risks, and explore opportunities with greater precision, as observed in the case studies analyzed, including Unilever's AI implementation. From an operational standpoint, the findings indicate that AI has the potential to transform traditional financial practices by automating repetitive tasks, reducing human errors, and accelerating critical processes such as financial consolidation and closing cycles. In Unilever's case, for example, financial process automation significantly reduced the time spent on manual activities, freeing human resources for more strategic functions.

Moreover, IoT sensors integrated with AI platforms have enabled real-time monitoring of logistics and energy costs, optimizing supply chains and reducing waste. The analysis of AI's impact on the P&L revealed that it contributes both to revenue maximization and cost reduction. In terms of revenue, machine learning algorithms have been used to personalize offers, dynamically adjust pricing, and predict demand trends, thereby increasing competitiveness and profitability. On the cost reduction side, intelligent automation and predictive maintenance have generated significant savings, particularly in logistics, energy, and inventory management. These advances not only improve operational margins but also enhance financial resilience in uncertain scenarios.

However, the implementation of AI in FP&A is not without challenges. The research highlighted that cultural resistance, reliance on legacy systems, and the need for integrating heterogeneous data sources are significant barriers to adopting this technology. Additionally, the rapid pace of technological evolution requires companies to maintain a proactive approach in updating their infrastructure and upskilling their teams to fully realize AI's benefits. Unilever, for instance, initially faced difficulties in integrating legacy systems with cloud-based platforms but overcame these obstacles by adopting a hybrid architecture and investing in interoperability. Another key aspect identified was the importance of data governance and ethics in AI applications. The collection, storage, and use of financial and operational data must comply with strict security and regulatory standards, especially in a context of growing concerns about privacy and transparency. Companies that neglect these issues may face not only legal risks but also reputational damage and a loss of stakeholder trust.

Based on the findings of this study, it is possible to conclude that AI plays a strategic role in maximizing P&L impact in the manufacturing industry by integrating advanced analytics, automation, and predictive insights into financial processes. However, its successful implementation depends on a holistic approach that considers technical, cultural, and ethical factors. For companies seeking to adopt AI in FP&A, it is

recommended to invest in technological infrastructure, promote continuous employee training, and foster an organizational culture that values innovation and adaptability.

From an academic perspective, this work contributes to the literature by comprehensively exploring the benefits and challenges of AI in FP&A, offering practical insights for industry managers and professionals. However, it is acknowledged that the reliance on secondary data and the rapid evolution of technology may limit the generalizability of the findings for future contexts. Thus, future studies could explore AI's application in FP&A through a combination of qualitative and quantitative methodologies, including interviews with managers and longitudinal analyses that track the evolution of technologies and their implications for P&L over time.

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