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Improving Forecast Accuracy as an Effort to Enhance Business Performance

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ABSTRACT

This study investigates the role of forecasting accuracy in improving business performance. Forecasting has become a critical managerial tool in dynamic business environments where demand fluctuations and market uncertainty often challenge strategic decision-making. The main objective of this research is to empirically test whether higher forecasting accuracy contributes significantly to enhancing business performance. A quantitative approach was employed using survey data collected using from firms in hospitality and the food and beverage industries. Data were analyzed using Structural Equation Modeling – Partial Least Squares (SEM-PLS) to examine the relationships among data quality, forecasting techniques, forecasting accuracy and business performance. The finding indicate that forecasting accuracy mediates the effect of data quality and forecasting methods on business performance. The study contributes to the literature by providing empirical evidence on the mediating role of forecasting accuracy and offers practical implications for managers to design more accurate forecasting systems that support sustainable business growth.

KEYWORDS *forecasting accuracy; business performance.*

INTRODUCTION

In an increasingly complex and competitive business era, a company's ability to make the right and fast decisions is a key factor in maintaining competitiveness. One of the important elements that support the strategic decision-making process is the accuracy in forecasting. Accurate forecasting allows companies to forecast market demand, plan inventory needs, set production schedules, and manage resources efficiently. In practice, however, many organizations still face challenges in producing accurate predictions due to limited historical data, the analytical capabilities of relevant stakeholders, conventional forecasting methods that rely on traditional intuition-based forecasting, and the lack of integration of advanced technology in the planning process. The phenomenon gap from previous research reveals that while strategic decision-making plays an important role, many companies face major challenges in this process, especially if they are not supported by predictive analytics (Adesina et al., 2024). One of the main challenges is the reliance on incomplete or inaccurate data (Balakrishnan et al., 2025). Conventional methods tend to be inadequate in responding to complex and dynamic data characteristics (Olamijuwon, 2024). In many cases, decision-makers must rely on their historical data or intuition, which may not fully reflect the complexity of the current business environment. This can lead to decisions made based on outdated or irrelevant information, increasing the risk of suboptimal decision-making. The limitation of the problem in this study focuses on the relationship between forecasting accuracy with business performance. This research is limited to companies in the hospitality industry in the Greater Jakarta area assuming that respondents have access to and understanding of the forecasting system and historical data related to actual forecasting. The unit of analysis in this study is the company level, not the individual.

Forecasting is the foundation revenue management and hotel operations, accurate prediction allows optimal rate determination, room allocation, supply chain management, scheduling Staff so that it directly affects the profitability of the company. There are traditional methods and machine learning in forecasting for future business projections. Traditional methods are still widely used today, but they are limited when dealing with the complex influence of external influences of a company. By utilizing machine learning & deep learning such as channel / online travel agent data, event calendar, competitor prices and climate, then the forecasting function will be more optimal. Technique budgeting involves the processing of numbers, estimation, attention to detail, application forecasting in an effort to provide the right strategic decisions (Homauni et al., 2023). The use of variables such as big data to improve forecasting, can allow companies to maintain cost efficiency and affect overall performance (Wellens et al., 2023). Through the use of large volumes of data, advanced analytics, companies can gain a deeper understanding of business operation, predict future trends and respond quickly to changing market conditions (Paramesha et al., 2024). Every business needs a specific strategy to maintain the sustainability of the company in an increasingly competitive business environment (Yuniawati & Farman, 2023).

The contribution of this research is intended for business practitioners as a reference, especially operational managers and those related in developing a more accurate and adaptive forecasting system. By understanding the factors that affect forecasting accuracy, companies can adopt more appropriate strategies and technologies to minimize operational risk and optimize business decision-making. This research makes a theoretical contribution by confirming that forecasting accuracy is not only a technical activity in operations management, but also has strategic implications for improving business performance. In addition, this study also contributes to business performance theory by showing that the accuracy of forecasting is closely related to the achievement of performance indicators such as profitability, customer satisfaction, and operational effectiveness. Thus, this research not only strengthens existing theories, but also presents a conceptual framework that integrates aspects of forecasting, operational efficiency, and business performance, thus opening up space for more comprehensive theory development.

Previous studies have shown that improving the accuracy of forecasting still faces a number of challenges, including unpredictable market dynamics (Balakrishnan et al., 2025), the limitations of traditional forecasting methods that are less adaptive to changing demand trends, as well as the constraints of data integration across departments within the organization. There are not many integrated system providers that comprehensively combine forecasting functions in a company's system (Siddiqui et al., 2022). What is the economic impact that depends on the level of competitiveness, especially in the tourism sector (Fernandez, 2022). Departing from limitations to reliability financial forecasting as well as future research and risk analysis, this study proposes novelty by examining integratively the relationship between forecasting accuracy and business performance, by including variables such as budgeting, big data and competitiveness as an independent variable and forecasting accuracy as a mediation variable. Thus, this approach will provide a more comprehensive conceptual framework, particularly in the industrial context hospitality such as hospitality which is heavily influenced by market uncertainty. Seasonal patterns in tourism businesses are considered a major concern and are considered quite a complex variable, but strategic in reading competitiveness can maximize the success of a tourism business performance by understanding accurate business forecasting strategies (Yabanci, 2023).

This research provides information on quality data, understanding trends, systems budgeting and big data technology are regarded as strategic resource which, when managed properly, will improve the accuracy of forecasting. (Salamah, 2023) concludes that effective financial management is influenced by various factors such as forecasting, budgeting & planning, has a crucial role in driving business performance improvement. (Adesina et al.,

2024) stating that predictive analytics has a profound impact on business performance through the provision of accurate data. (Eton et al., 2022) stating that the implementation of good financial management practices can increase the profitability of a business. (Sinebe, 2023), stating that financial evaluation and planning show the least influence on business performance. (Srie Yuniawati et al., 2023) adding that the ability to evaluate financial statements ranging from forecasting to financial analysis, affects the profitability ratio as part of business performance. Flexibility in forecasting allows companies to respond to market changes more quickly and appropriately, which is essential for maintaining competitiveness (Grobler-Dębska et al., 2025). Formal adoption of predictive analytics is a must for companies that want to build resilience and competitiveness in today's fast-changing business competition (Akpe et al., 2021). Forecasting accuracy is one of the many possibilities of business analytics in the budgeting process that provides deep insights and better coordination in running a business (Bergmann et al., 2020).

Forecasting Theory explains that accurate business forecasting is heavily influenced by the quality and quantity of data, analysis methods and external factors such as seasonality and trends. This theory reinforces the relationship between variables such as budgeting, big data tools and competitiveness against accuracy forecasting. Forecasting theory is based on the premise that present and past knowledge can be used to make predictions about the future, particularly in analyzing historical values can be identified and applied effectively in the process of predicting future values (Petropoulos et al., 2022). Forecasting process enabling the modeling and optimization of future business activities. The application of forecasting tools in an integrated corporate governance system can make business activities more predictable, more manageable and more controllable (Yaremko et al., 2022).

This study aims to empirically examine the effect of forecasting accuracy on business performance. Specifically, the objectives of this research are to analyse how improvements in forecasting accuracy contribute to enhance business performance, to evaluate the role of predictive technologies such as machine learning and data analytics in supporting forecasting effectiveness, and to provide practical references for companies in designing effective and efficient forecasting systems to support business decision-making. In addition, this study investigates whether human resource competence acts as a moderating variable that strengthens or weakens the relationship between forecasting accuracy and business performance.

Based on the literature review, several hypotheses are developed. The quality and quantity of data are fundamental in building reliable forecasting models. Clean, accurate, relevant, and sufficiently large datasets enable forecasting models to generate more precise predictions, while errors in historical data significantly reduce forecasting performance.

A systematic and data-driven budgeting process can support forecasting accuracy. Realistic budgets that are responsive to historical data enable firms to estimate costs and revenues with greater precision.

H1: Budgeting has a positive effect on forecasting accuracy.

The use of big data technologies such as analytics tools, machine learning, and cloud-based forecasting platforms enhances efficiency and predictive capability by accelerating the processing of large and complex datasets.

H2: Big data tools have a positive effect on forecasting accuracy.

Competitive pressure encourages organizations to improve planning accuracy and allocate greater attention to forecasting activities in operational and strategic planning.

H3: Competitiveness has a positive effect on forecasting accuracy.

Accurate forecasting enables companies to plan business activities more efficiently, reduce production and operational costs, improve customer service, and strengthen financial performance. Therefore, forecasting accuracy is expected to contribute directly to improved business performance.

H4: Forecasting accuracy has a positive effect on business performance.

Furthermore, this study assumes that forecasting accuracy mediates the relationship between budgeting, big data tools, competitiveness, and business performance.

RESEARCH METHOD

This study employs a quantitative research approach aimed at testing the empirical relationships among variables. Forecasting accuracy is positioned as a mediating variable influenced by independent variables such as budgeting, big data tools, and competitiveness while business performance serves as the dependent variable. The research design follows a causal framework, focusing on testing the influence of one variable on another.

Primary data were collected through a quantitative survey method, as it allows for more relevant and direct insights into companies' operational outcomes. Questionnaires were distributed to respondents in the hospitality industry, a sector that is highly dependent on demand forecasting to maintain operational efficiency, optimize production, and enhance overall business performance.

Purposive sampling was applied to determine the research sample. This technique was chosen based on specific criteria, including companies that have implemented forecasting systems for at least two years, possess measurable performance data, and are willing to participate in the study. This approach enables researchers to focus on the most relevant and informative respondents, thereby increasing internal validity, while also being effective under time and resource constraints that limit the application of probabilistic sampling.

Data analysis was conducted using SmartPLS version 4 with the Partial Least Squares–Structural Equation Modelling (PLS-SEM) technique. This method was selected due to its ability to test complex causal relationships with relatively small sample sizes and without strict assumptions of data normality. The minimum sample size follows practical quantitative research guidelines, suggesting 30–100 respondents to ensure estimation stability.

Data collection was carried out through electronic questionnaires distributed via professional networks, industry associations, and company referrals. Initial screening questions were included to ensure respondent eligibility. The questionnaire employed a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Instrument development was based on prior literature and expert consultation. A pilot test involving 30 respondents was conducted to assess validity and reliability before full deployment. The final data collection period lasted two weeks, yielding 61 valid respondents.

RESULT AND DISCUSSION

The measurement model evaluation was conducted through outer loadings, convergent validity (Average Variance Extracted/AVE), construct reliability (Cronbach's Alpha and Composite Reliability), and discriminant validity using the HTMT criterion. The results indicate that most indicators demonstrate acceptable outer loading values, particularly for big data and forecasting accuracy constructs, which exhibit strong explanatory power.

The outer loadings for almost all indicators meet the ideal threshold of 0.70. one indicator of the Budgeting construct (BG1) shows a loading value of 0.680, which is slightly below the recommended threshold. However, it remains acceptable, particularly for exploratory research. Other indicators such as those for the Big Data construct (BD1-BD4), exhibit very high outer loading values, indicating strong explanatory power in representing the Big Data construct and suggesting excellent measurement quality. Indicators of the Competitiveness construct (CT1-CT4) also satisfy the criteria for convergent validity, demonstrating that the core aspects of competitiveness are strongly represented within the model. All Forecast Accuracy indicators (AF1-AF5) show loading values above the 0.70 threshold, leading to the conclusion that the Forecast Accuracy construct is consistently and reliably reflected by its indicators. Furthermore, the Business Performance indicators (BP1-BP4) exhibit outer loading values greater than 0.70, indicating that the business performance

construct is consistently measured by all of its indicators. This finding suggests that the indicators employed successfully capture the correlation between indicator scores and the underlying variable, thereby supporting the construct validity of the measurement model.

In addition, the Average Variance Extracted (AVE) values for all constructs exceed the threshold of 0.50. The Convergent Validity (AVE) test results for each variable indicate values of 0.673 for Budgeting, 0.769 for Big Data, 0.651 for Competitiveness, 0.554 for Forecast Accuracy, and 0.697 for Business Performance. As all five variables demonstrate AVE values above 0.50, convergent validity is confirmed. Accordingly, the measurement model employed in this study is deemed valid.

The discriminant validity assessment using the HTMT method indicates that all constructs obtain values below 0.90, suggesting that each construct in the research model demonstrates adequate conceptual distinctiveness and that no discriminant validity issues are present. Accordingly, the measurement model satisfies the criteria for discriminant validity.

The reliability assessment was conducted using Cronbach's Alpha with a threshold criterion of > 0.70. The results indicate that all constructs achieve satisfactory Cronbach's Alpha values, namely 0.755 for Budgeting, 0.899 for Big Data, 0.828 for Competitiveness, 0.799 for Forecast Accuracy, and 0.856 for Business Performance. These findings suggest that the indicators within each construct consistently measure the same underlying latent concept. Consistent results are also observed in the Composite Reliability test, with all values exceeding the recommended threshold of 0.70, specifically 0.798 for Budgeting, 0.907 for Big Data, 0.901 for Competitiveness, 0.799 for Forecast Accuracy, and 0.885 for Business Performance. This indicates strong construct reliability and good measurement stability. Overall, the results demonstrate that all constructs exhibit Cronbach's Alpha and Composite Reliability values above 0.70. Therefore, it can be concluded that the research instrument possesses good internal consistency and that the measurement model employed in this study is reliable.

The Variance Inflation Factor (VIF) results indicate that all Budgeting indicators (BG1–BG3) have VIF values below 3.0. One indicator of the Big Data construct (BD2) exhibits a VIF value of 5.354, suggesting a potential issue of high multicollinearity. The VIF values for Competitiveness indicators (CT1–CT4) are below 3.0, those for Forecast Accuracy indicators (AF1–AF5) are below 2.0, and those for Business Performance indicators (BP1–BP4) are below 3.0. The collinearity assessment of the outer model shows that the majority of indicators have VIF values below the threshold of 3.0. However, one indicator within the Big Data construct presents a VIF value above 5, indicating relatively high collinearity. Nevertheless, this indicator is retained due to its strong conceptual relevance and high outer loading value, and thus it does not reduce the overall quality of the measurement model.

Hypothesis Testing

Hypothesis testing was conducted to examine the significance of the relationships among variables. The analysis employed a bootstrapping technique, in which the data were processed to estimate path coefficients and their corresponding standard errors. The results are reported in the form of t-statistics and p-values. A hypothesized relationship is considered statistically significant when the p-value is less than the significance level of 0.05.

Table 1 presents the results of the hypothesis testing

Variable	Hypothesis Direction	Beta	P-Value	Conclusion
Budgeting (X1)	Positive	0.264	0.046	Hypothesis is supported
Big Data (X2)	Positive	0.450	0.004	Hypothesis is supported

Competitiveness (X3)	Positive	0.032	0.375	The hypothesis is not supported
Forecast Accuracy (M)	Positive	0.555	0.000	Hypothesis is supported
Adjusted R2:	0.296			
F-test:	8.46	sig. 0.000097		

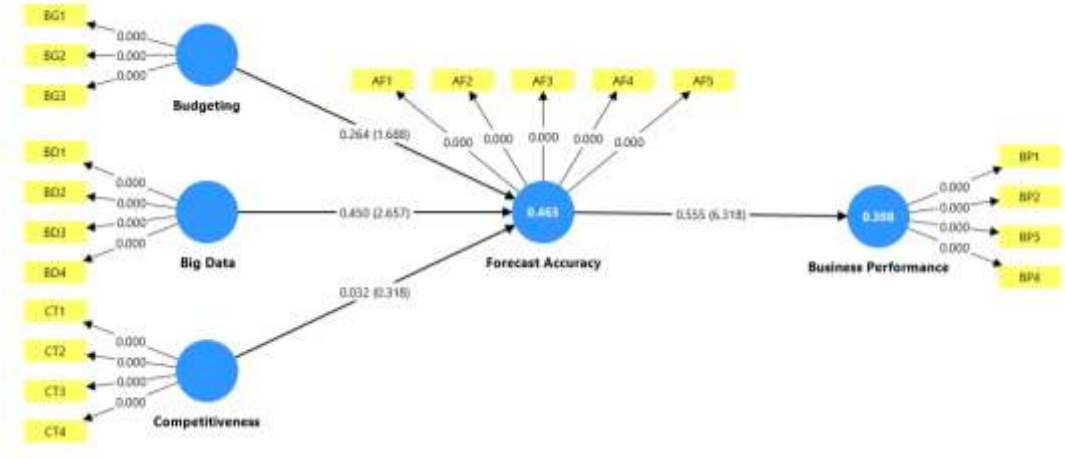

Figure 1. Research Model (SmartPLS)
Source: Processed by the researcher (2025)

The Influence of Budgeting on Forecast Accuracy

The hypothesis testing results show that budgeting has a positive and significant effect on forecast accuracy (β = 0.264; p = 0.046). Although the effect is moderate, the findings indicate that in a dynamic competitive environment, forecasting cannot rely solely on traditional planning mechanisms, but requires the support of data and information technology. The results suggest that a systematic and structured budgeting process, supported by adequate information, can help companies improve forecasting accuracy. Budgeting and forecasting can complement each other simultaneously to enhance operational performance (Bukh let lal., l2025). Conceptually, budgeting functions as a tool for coordination, control, and internal communication, providing a baseline for planning and operational tolerance. These findings support Planning Theory, which emphasizes the importance of budgeting in organizational planning processes (Abbo, L2024).

The Influence of Big Data on Forecast Accuracy

The results show that big data has a positive and significant effect on forecast accuracy (β = 0.450; p = 0.004). The findings indicate that the higher a company's ability to collect, process, and analyze large and diverse datasets, the more accurate its forecasting process becomes. Theoretically, these results are consistent with information processing theory, which emphasizes that organizations with greater information-processing capacity are better able to respond to uncertainty. Big data provides real-time and context-rich information that helps reduce forecasting errors. The findings are also in line with previous studies showing that the adoption of big data analytics improves predictive capability, demand planning, and operational decision accuracy (Mkhize let lal., l2025). Through machine learning, companies can further enhance their ability to predict trends and future business movements, thereby supporting strategic decision-making (Ganesan, L2024). Thus, big data plays an important role in improving forecast accuracy.

The Influence of Competitiveness on Forecast Accuracy

Unlike the previous two variables, the results show that competitiveness does not have a significant effect on forecast accuracy (β = 0.032; p = 0.375). In other words, the intensity of competition does not directly encourage companies to improve their forecasting performance. This finding provides an interesting theoretical contribution. Although market competition is often believed to encourage firms to enhance adaptability and responsiveness, the results of this study indicate that competitive pressure does not necessarily lead to improved forecasting. Several possible explanations can be considered: (a) companies may not yet have sufficient adaptive capacity to respond to competitive pressure through improved forecasting, and (b) competition may influence strategic decisions more strongly than operational practices such as forecasting. Empirically, the findings show that improvements in forecast performance are more influenced by internal capabilities (budgeting and big data) than by external factors such as competition.

The Influence of Forecast Accuracy on Business Performance

The results of this study indicate that forecast accuracy has a positive and significant effect on business performance (β = 0.555; p = 0.000), representing the strongest relationship in the model. These findings demonstrate that forecast accuracy directly improves business performance. Accurate forecasting enables organizations to enhance operational performance, even within a one-year planning period (Efat let lal., l2024). Forecast accuracy has strong predictive power for company performance and is closely related to profitability (Tanaka let lal., l2020). Accurate forecasting allows companies to: (a) improve operational efficiency, (b) optimize production capacity, (c) make more accurate strategic decisions, and (d) monitor operational costs more effectively. These results support the operations management, supply chain planning, and strategic management literature, which emphasizes forecasting accuracy as a key determinant of organizational performance.

CONCLUSION

This research analyses the role of budgeting, big data, and competitiveness in improving forecast accuracy, as well as the impact of forecast accuracy on business performance. Using the Partial Least Squares–Structural Equation Modelling (PLS-SEM) approach, several empirical findings were obtained that contribute to both theoretical development and managerial practice.

First, the results indicate that big data is the most dominant factor in improving forecast accuracy. This significant influence shows that organizations with the ability to manage large volumes of data with high accuracy and diverse formats are better able to produce more precise predictions. These findings support data-driven decision-making, emphasizing that big data has become a strategic digital capability that plays a critical role in modern forecasting systems, particularly in increasingly complex and uncertain market environments. Big data enables organizations to generate accurate demand forecasts and supports forecasting activities more effectively.

Second, the findings show that budgeting has a positive and significant influence on forecast accuracy, although the magnitude of its effect is smaller than that of big data. The results indicate that a structured budgeting system, supported by comprehensive control and evaluation mechanisms, provides direction and boundaries for future projections. Thus, budgeting functions as a coordination instrument that influences forecast accuracy not only for technical purposes but also for strategic purposes that support organizational success.

Third, the results show that competitiveness does not have a significant influence on forecast accuracy. These findings indicate a disconnect between external competitive pressure and internal organizational responses in the context of forecasting. Theoretically, market competition is expected to encourage organizations to become more adaptive and responsive.

However, the results of the model show that the intensity of competition does not automatically translate into increased predictive capability. This condition suggests that improving forecast accuracy is not merely a response to competitive pressure but depends more on internal organizational capabilities. The situation may be caused by a lack of organizational readiness to translate competitive dynamics into improvements in forecasting practices, making internal factors more dominant than external pressures.

Fourth, the results indicate that forecast accuracy has a very significant impact on business performance. Forecast accuracy plays a crucial role in improving business performance, including operational efficiency, strategic effectiveness, inventory management, and customer satisfaction. Accurate predictions help organizations reduce operational risks and align forecasting outcomes with organizational goals such as cost efficiency and service quality. As a result, forecast accuracy contributes directly to optimizing overall company performance.

Overall, the conclusions of this study indicate that data capabilities and budgeting systems play a more important role in improving forecast accuracy than external factors such as the intensity of competition. Furthermore, forecasting practices are proven to play a central role in achieving optimal business performance. Forecasting accuracy and budgeting are not only technical necessities but also strategic necessities that drive organizational success. Organizations that invest in adaptive and data-driven forecasting processes tend to be better prepared to achieve improved financial performance and sustain competitive advantages in dynamic environments.

Despite its significant theoretical and practical contributions, this study has several limitations that must be considered when interpreting the results. The relatively small sample size may limit the generalizability of the findings. Although PLS-SEM can accommodate smaller samples, future studies with larger samples and broader scopes are needed to enhance external validity. In addition, this study uses a cross-sectional design in which data are collected at a single point in time, limiting the ability to observe long-term changes and dynamic relationships among variables. Therefore, causal interpretations should be made with caution.

The measurement of variables relies on perceptual instruments using self-reported questionnaires. Although validity and reliability have been statistically tested, the potential for perceptual bias, such as social desirability bias or common method bias, remains. Furthermore, the competitiveness construct may not fully capture the complexity of industrial competition, which includes dimensions such as technological disruption, regulatory changes, and global market uncertainty that are not entirely represented in the measurement instruments. Finally, this study does not incorporate other potentially relevant variables, such as supply chain integration, technological capability, and human resource quality, which may further enrich the understanding of factors influencing forecast accuracy and business performance.

Based on the conclusions and limitations of this study, several practical and future research recommendations can be proposed. From a practical perspective, companies are encouraged to prioritize investment in big data analytics to strengthen forecasting processes. Improvements in data infrastructure, data competence, and information system integration should become key organizational development priorities. Companies are also encouraged to modernize their budgeting systems by adopting more flexible approaches, such as rolling forecasting and zero-based budgeting, which are more responsive to changes in business conditions.

In addition, organizations should recognize that competitive intensity is not the primary determinant of forecasting improvement. Therefore, forecasting enhancement should not depend solely on market pressure. Instead, organizations should proactively develop internal capabilities, including cross-departmental coordination, information system integration, and the formation of dedicated forecasting teams. Management is strongly encouraged to position

forecast accuracy as a strategic focus within organizational planning and decision-making processes.

For future research, it is recommended to increase sample size, expand the range of industrial sectors, or apply longitudinal research designs to capture long-term dynamics among variables. Future studies may also include additional variables such as supply chain integration, technological capability, environmental uncertainty, or organizational learning as mediating or moderating variables. Furthermore, multigroup analysis can be applied to examine differences based on industry characteristics or organizational size. By incorporating additional variables and methodological approaches, future research is expected to provide a more comprehensive understanding of forecasting accuracy and business performance.

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