# Business Forecasting in Collaboration with Generative AI

Subhadra Ganguli * , Ana Mercado , Collin Jackson Byrnes , Joshua D. Davitt , Joseph John Fitzpatrick Jr. , Christopher William Howell

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*Article*

# Business Forecasting in Collaboration with Generative AI

**Subhadra Ganguli, Ana Mercado, Collin Jackson Byrnes, Joshua D. Davitt, Joseph John Fitzpatrick Jr., Christopher William Howell and Meg Raj Lagun**

Penn State University Lehigh Valley; smg6870@psu.com; amm11029@psu.edu; cjb6870@psu.edu; jkd5735@psu.edu; jjf6259@psu.edu; crh20@psu.edu; mrl5427@psu.edu

* Correspondence: smg6870@psu.edu

**Abstract:** Students in an undergraduate upper-level Business Forecasting course at Penn State University Lehigh Valley apply Generative AI to explore its role in enhancing case study analysis. The students use a Harvard Business School case study to analyze the role of business forecasting in predicting demand for a new product in the market under specific conditions. Students first discuss the case study individually and then use AI with "prompt engineering" techniques to compare results under two different scenarios. The findings suggest that AI generally improved the depth and structure of responses, refining students' arguments and adding several insights that were sometimes overlooked in independent analyses. However, students also noted instances where AI produced overly generic responses or failed to capture the full context of the case. While AI mostly increased productivity and quality of work, the results were not uniformly positive. Overall, students considered AI a collaborator rather than a mere tool, finding its use rewarding but requiring human oversight for optimal effectiveness.

**Keywords:** case study; generative AI; business economics; business forecasting; prompt engineering; domain knowledge; market demand

## 1. Introduction

Forecasting plays a crucial role in business decision-making, particularly in industries characterized by technological advancements and market uncertainties. The ability to predict demand accurately influences corporate strategy, investment allocation, and risk assessment. Traditionally, business forecasting relies on historical data analysis, statistical models, and expert judgment. However, with the rise of artificial intelligence (AI), and generative AI in particular, forecasting has evolved to incorporate machine learning and natural language processing, allowing for more complex and dynamic analyses.

This study explores the integration of Generative AI in business forecasting education by analyzing student experiences with a Harvard Business School case study, E.T. Phone Home, Inc.: Forecasting Business Demand [6]. The case examines the challenges faced by a telecommunications company applying for an FCC (Federal Communications Commission) cellular radio license in Cleveland in 1982. Students were tasked with assessing potential business and marketing challenges, evaluating the firm's forecasting approach, and identifying pitfalls in the forecasting strategy.

Students first analyzed the case independently, formulating responses based on their understanding and application of business forecasting principles. They then used Generative AI to refine and expand their responses, evaluating whether AI enhanced or hindered their analytical processes. This study assesses how AI contributed to answering the case study questions, identifying both its benefits and limitations in supporting student learning and decision-making.

## 2. Literature Review

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Business forecasting has long been a subject of interest in economic and managerial research. Traditional forecasting techniques include time series analysis, regression models, and industry trend assessments [14]. While these methods provide structured insights, they often struggle with market disruptions and emerging trends [2].

With advancements in AI, forecasting has undergone significant transformation. AI driven models enable real-time data processing, predictive analytics, and automated decision-making [7]. However, AI's accuracy depends on the quality of data inputs and its ability to contextualize predictions effectively [5].

In educational settings, AI has shown promise in enhancing student learning by improving content organization, suggesting alternative arguments, and streamlining data analysis [12]. However, overreliance on AI generated insights may diminish critical thinking and independent problem-solving skills. This study examines the extent to which AI contributes meaningfully to business forecasting analysis and whether it serves as a true collaborator rather than an automated assistant.

The integration of Generative AI in business forecasting and education is increasingly explored in research, revealing both opportunities and challenges. This section reviews relevant literature on AI's role in economic research, its application in education, and student perceptions of AI tools in learning environments.

### *2.1. AI in Business Forecasting and Economic Research*

AI has demonstrated significant potential in economic research, particularly in automating microtasks, enhancing productivity, and offering new analytical approaches. [13] discusses how large language models (LLMs) such as ChatGPT assist economists in areas such as ideation, background research, data analysis, and mathematical derivations. The study highlights AI's ability to generate insights, automate repetitive tasks, and aid in coding and statistical analysis. However, it also warns of AI's limitations, particularly regarding hallucinations, bias, and the necessity of human oversight to ensure contextual accuracy.

In the context of business forecasting, AI driven models provide more precise demand predictions by analyzing large datasets and identifying patterns that traditional forecasting methods may overlook. However, researchers emphasize that while AI enhances efficiency, it should complement rather than replace human judgment, particularly in areas requiring contextual understanding and strategic decision-making.

### *2.2. AI in Education: Opportunities and Challenges*

The role of AI in education is evolving, offering significant advantages but also presenting concerns. [15] explore student perceptions of ChatGPT in Economics and Business education. Their study finds that students benefit from AI tools in terms of improved confidence, collaboration, and learning outcomes. However, challenges persist, particularly regarding overreliance on AI generated content, the need for critical thinking skills, and the potential for misinformation when AI is used without proper guidance.

Similarly, [22] discusses the dual impact of AI in education. On one hand, AI assisted learning has led to significant educational gains, as demonstrated by a World Bank study in Nigeria, where AI powered tutoring accelerated student progress. However, AI can also diminish critical thinking skills if students overly trust AI outputs without questioning their validity. [22] suggests that AI should be framed as a provocateur rather than an authority, challenging students to refine their reasoning rather than replacing independent thought.

### *2.3. Student and Faculty Experiences with AI in Learning*

[13] also emphasizes the importance of AI as a collaborative tool rather than a substitute for human analysis. AI's ability to summarize research, provide feedback, and identify alternative perspectives makes it an effective partner in academic settings. However, students and educators must actively engage with AI rather than passively accepting its outputs.

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A key finding across multiple studies is that AI enhances productivity but requires structured integration into learning environments. [15] recommend faculty led AI engagement, where instructors design activities that encourage critical analysis of AI generated content. Similarly, [22] stresses the need for clear goals and structured AI interactions to ensure that students develop analytical skills rather than blindly following AI outputs.

The role of Artificial Intelligence (AI) in business education has expanded significantly in recent years, with Generative AI (GenAI) emerging as a transformative tool for students and educators. The literature highlights both the opportunities and challenges associated with generative AI integration in business forecasting, decision-making, and pedagogy. Section 2 reviews key themes in AI adoption, student experiences with AI assisted learning, and its impact on business forecasting and international business education.

### *2.4. AI in Business Forecasting and Decision-making*

AI has transformed business forecasting by improving demand prediction, risk assessment, and scenario planning. [13] explores the role of AI in economic modeling and forecasting, emphasizing that AI can assist in automating microtasks, processing large datasets, and generating scenario-based analyses. AI driven models, such as neural networks and Monte Carlo simulations, enable businesses to assess various market risks and predict demand more accurately.

[21] highlight that AI tools can refine business forecasting accuracy by integrating real-time data and predictive analytics. However, they note that while AI enhances decision-making, it requires human oversight to avoid overreliance on algorithmic outputs.

A key challenge identified in AI driven forecasting is the lack of contextual awareness in historical settings. AI tends to generate data driven, pattern-based predictions but may not fully account for industry specific or time sensitive variables, which require human intuition and domain expertise.

### *2.5. AI in Business Education and Student Learning Experiences*

The integration of AI in business education has reshaped learning environments, offering students personalized learning paths, interactive tutoring, and real-time feedback mechanisms. Several studies emphasize AI's potential to enhance student engagement, content comprehension, and collaborative learning.

[26] conducted a systematic review of AI applications in higher education, identifying four major roles of AI in academic support:

Profiling and prediction where AI can predict student success rates based on learning patterns; assessment and evaluation where AI automates grading, feedback, and student evaluations; adaptive learning systems where AI personalizes content delivery based on individual student needs and finally, Intelligent Tutoring Systems (ITS) where AI based tutoring enhances student engagement by providing real-time assistance.

[11] further discuss how AI enhances online learning in international business education. They highlight that AI powered courses can bridge language barriers, personalize learning, and provide real-time analytics for educators. However, they caution against digital divide issues, where students with limited access to AI tools may face disadvantages in AI enhanced learning environments. Similarly, [4] emphasizes AI's potential to redefine business education through prompt engineering and scenario-based learning. AI enables cross-cultural learning experiences, helping students analyze business case studies from diverse perspectives. However, challenges such as AI-generated misinformation, biases, and lack of instructor readiness remain critical concerns.

### *2.6. AI as a Teaching and Learning Tool in Business and International Education*

AI's role in business and international education is evolving, with educators leveraging AI to enhance course content, automate administrative tasks, and provide interactive learning experiences. The study by [21] underscores that students perceive AI as a valuable tool for academic success, but their familiarity with AI applications remains limited. Many students use AI for administrative support (e.g., summarization, document review) rather than deep analytical tasks such as business

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forecasting. Our research tries to find out what the results are with AI as a collaborator in analyzing business forecasting techniques.

The study by [11] introduces an AI enhanced international business course, featuring multilingual voiceovers, AI driven content interlinking, and adaptive learning techniques. The authors note that AI driven interactivity improves student engagement, but educators must actively shape AI usage to prevent passive learning behaviors. Our research compares how researcher and AI can work together in improving forecasting technique analysis.

Additionally, [26] emphasize that AI powered intelligent tutoring systems (ITS) enhance student performance but caution that AI cannot replace human intuition in education. While AI improves automated grading and feedback systems, students must be trained to critically evaluate AI generated responses. Our research aims at AI human collaboration where humans are trained to critically evaluate their own tasks against the work that AI produces.

### *2.7. Challenges and Ethical Considerations in AI Assisted Learning*

Despite its benefits, AI raises ethical concerns in business education. Studies emphasize the risks of academic dishonesty, overreliance on AI, and bias in AI generated content. This aspect is not raised in our study as the comparative analysis between work produced by AI and humans require students to perform their tasks based on understanding of the forecasting techniques.

### *2.8. Risk of Over Reliance on AI*

AI's automated feedback and predictive capabilities can encourage passive learning if students rely solely on AI generated insights. [21] argue that many students do not fully understand AI's capabilities and limitations, leading to misinterpretation of AI generated outputs.

### *2.9. Digital Divide and Unequal Access to AI*

[11] warn that some students have better access to AI enhanced tools than others, creating educational disparities. The authors recommend structured AI training programs to bridge knowledge gaps among students. All researchers in this paper had equal access to Perplexity Pro and Copilot access provided by the Penn State university free of cost.

### *2.10. AI's Limitations in Contextual Understanding*

[4] highlights that AI struggles with cross-cultural nuances in international business education. [26] emphasize that AI lacks deep pedagogical insights, requiring educator oversight to ensure meaningful learning outcomes.

### *2.11. AI's Role in Enhancing Critical Thinking, Not Replacing It*

[11] suggest that AI should be treated as a collaborator rather than a replacement for independent student analysis. [4] proposes integrating AI into problem-solving exercises, requiring students to compare AI generated responses with their own analyses.

## 3. Purpose and Implication of This Study

This study builds upon existing research by analyzing:

- How students engage with AI in business forecasting case studies;
- The differences between AI assisted and independent student analyses;
- Whether AI enhances or hinders critical thinking and forecasting accuracy.

The literature supports the integration of AI in business education, emphasizing its role in enhancing decision-making, improving learning experiences, and supporting international business students. However, AI's limitations—such as bias, reliance on historical data, and lack of contextual understanding—require educator intervention to ensure effective learning outcomes. As AI tools evolve, future research should explore longitudinal studies on AI's impact on forecasting accuracy and student engagement.

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The existing literature underscores the potential of AI in business forecasting education, particularly in improving forecasting accuracy, refining arguments, and enhancing student engagement. However, it also highlights challenges such as bias, overreliance, and the importance of faculty guidance. This study builds on these discussions by analyzing how students engage with AI when assessing a business forecasting case study, comparing their independent analyses with AI assisted responses to determine whether AI contributes meaningfully to critical thinking and forecasting accuracy.

## 4. Methodology

### *4.1. Study Design*

The study employs a comparative approach where students analyzed a business case study through two methods:

- Independent Analysis – Students first responded to the case study questions without AI assistance;
- AI Assisted Analysis – Students then used Generative AI to refine their responses, employing prompt engineering techniques to enhance their analysis.

### *4.2. Data Collection*

Students submitted two versions of their analysis—one independently written and one AI assisted. Students also compared the two versions stating the pros and cons of each. Additionally, qualitative feedback was gathered to assess student perceptions of AI's contributions to their learning process.

### *4.3. Evaluation Criteria*

The study evaluates student responses based on three key aspects:

- Identification of business and marketing challenges by themselves and separately by AI;
- Assessment of forecasting approaches by themselves and by AI separately;
- Recognition of forecasting pitfalls in both cases.

AI assisted responses were compared against independent analyses carried out by the authors to determine whether AI added depth, improved logical structure, or introduced irrelevant information.

## 5. Analysis and Findings

### *5.1. Business and Marketing Challenges for ETPH*

Students identified several key challenges that ETPH would face if granted an FCC (Federal Communications Commission) license such as market competition, high infrastructure costs, consumer awareness, economic constraints and regulatory barriers.

Students mention that these arose in the forms of competition against established firms like AT&T and MCI posed significant hurdles; the need for expensive network investments increased financial risks; limited public familiarity with cellular technology required extensive marketing efforts; high unemployment in Cleveland affected consumer purchasing power; compliance with FCC licensing and telecommunications laws added complexity.

### *5.2. AI's Contribution to Business Challenge Analysis*

AI-assisted responses generally reinforced these challenges but added additional insights, such as potential pricing strategies to overcome consumer hesitation, the role of brand differentiation in capturing market share and external economic factors influencing demand forecasts. However, some students noted that AI's responses lacked specificity, particularly in contextualizing the regulatory landscape in 1982.

### *5.3. Evaluation of Forecasting Approaches*

Students assessed Digitron's (the company in the case study) forecasting strategy, identifying both strengths and weaknesses. Strengths included Engaging external research firms improved data

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credibility; scenario modeling (pessimistic, expected, optimistic) provided a structured forecasting approach; historical technology adoption trends helped establish demand projections. Its weaknesses were --overreliance on historical data without adjusting for emerging trends; limited sample size (400 businesses surveyed) reducing reliability; and unrealistic 50% market share assumptions ignoring competitive pressures.

### *5.4. AI's Contribution to Forecasting Analysis*

AI played a crucial role in refining students' forecasting assessments by providing structured insights, alternative forecasting models, and deeper contextual analysis. Students reported that AI-assisted responses helped them frame their arguments more coherently, allowing them to explore additional variables that they had not initially considered.

One of the primary contributions of AI was its ability to introduce risk-adjusted forecasting techniques. AI suggested incorporating Monte Carlo simulations and sensitivity analyses to test how changes in economic conditions, consumer behavior, and regulatory policies might impact Digitron's demand forecasts. This approach allowed students to think beyond deterministic forecasts and consider probabilistic scenarios where multiple outcomes could emerge based on varying assumptions. Additionally, AI-assisted analysis emphasized the importance of external variables in forecasting, such as: macroeconomic indicators, including inflation, unemployment, and disposable income, which directly impact consumer demand for new technologies. Competitor behavior, such as pricing adjustments, promotional strategies, and technological innovations could influence market share. Regulatory changes, including potential shifts in FCC policies and their impact on market entry barriers were considered.

AI improved the structuring of arguments, helping students present their points with clearer logical flow. While their independent responses often contained fragmented thoughts, AI-assisted revisions helped streamline ideas, ensuring more concise and impactful discussions. Some students found that AI was particularly useful in summarizing lengthy analyses into bullet points or key takeaways, making their responses more readable and professional. However, despite these advantages, students encountered several limitations in AI's forecasting contributions, one being the lack of case-specific insights. AI tended to generate responses based on general forecasting principles rather than the unique conditions of the 1982 telecommunications industry. For instance, while AI suggested demand elasticity models, it did not fully account for the novelty of cellular technology at the time, which made historical comparisons to other industries less applicable. Second was its overreliance on textbook definitions. Some students noted that AI's responses often included generic definitions of forecasting techniques rather than applying them directly to the case study. While this provided useful theoretical grounding, it required human intervention to ensure relevance. They also pointed out at AI's inconsistent depth of analysis: While AI often introduced additional considerations, it sometimes failed to elaborate on them sufficiently, requiring students to expand on AI-generated insights themselves. Overall, AI significantly enhanced students' forecasting analyses by providing structured arguments, identifying additional risk factors, and offering alternative models. However, human oversight remained essential in ensuring that AI-generated responses remained applicable to the case study's specific context.

### *5.5. Pitfalls in Forecasting Strategy and AI's Role*

Students identified several pitfalls in Digitron's forecasting strategy, which AI helped clarify and, in some cases, expand upon. The most significant pitfalls included were static assumptions about market demand; overestimated market share; underestimation of price sensitivity; regulatory and infrastructure risks and negligence of consumer adoption barriers and finally, AI's Role in identifying and addressing students' forecasting pitfalls.

#### 5.5.1. Static Assumptions About Market Demand

One of the major weaknesses in Digitron's forecasting approach was its rigid reliance on historical data without adjusting for the evolving nature of consumer demand. AI-assisted responses highlighted the need for more adaptive forecasting techniques, such as dynamic models that

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incorporate real-time data updates rather than static historical trends. AI also suggested scenario planning to address potential market shifts. This method would allow Digitron to create contingency plans for different levels of adoption, technological advancements, and economic downturns.

#### 5.5.2. Overestimated Market Share

Digitron assumed a 50% market share, which students and AI both identified as overly optimistic given the presence of strong incumbents such as AT&T and MCI. AI-assisted responses emphasized the importance of competitive analysis, suggesting that Digitron should perform detailed market positioning assessments and competitor benchmarking to better estimate realistic market share potential.

#### 5.5.3. Underestimation of Pricing Sensitivity

Students found that Digitron's pricing models lacked granular analysis of consumer willingness to pay. AI contributed by recommending price elasticity models, which would help assess how different pricing strategies could impact demand. However, AI sometimes failed to consider the historical context—namely, that cellular technology in 1982 was a luxury product with limited early adopters, making traditional price elasticity assumptions less reliable.

#### 5.5.4. Regulatory and Infrastructure Risks

We (student authors in this paper) identified FCC approval uncertainties as a major forecasting pitfall. AI-assisted responses reinforced this by highlighting the potential delays in licensing, unforeseen compliance costs, and regulatory shifts that could impact Digitron's market entry timeline. AI also introduced the concept of regulatory risk mitigation, suggesting that Digitron should incorporate legal and policy trend analysis into its forecasting models.

#### 5.5.5. Neglect of Consumer Adoption Barriers

Students noted that Digitron focused heavily on business customers while neglecting the broader consumer market. AI-assisted responses helped by suggesting consumer behavior modeling techniques, which could predict the gradual shift from business adoption to mass-market adoption. However, AI responses sometimes failed to capture the psychological factors influencing technology adoption, such as consumer skepticism toward cellular services in the early 1980s. This highlighted a gap in AI's ability to fully grasp historical consumer sentiment.

#### 5.5.6. AI's Role in Identifying and Addressing Forecasting Pitfalls

AI generally added value by reinforcing existing student insights and introducing additional forecasting pitfalls that students had not initially considered. The main areas where AI improved student analysis included: encouraging scenario-based forecasting instead of relying on static models; highlighting regulatory and market risks that could affect Digitron's projections; suggesting alternative demand forecasting techniques, such as Monte Carlo simulations and dynamic modeling.

However, students also found limitations in AI's contributions. AI sometimes provided overly broad suggestions without deep contextual analysis; AI lacked industry specific expertise, occasionally making unrealistic comparisons to modern-day telecommunications markets rather than focusing on the historical conditions of 1982 and finally, AI struggled with nuanced understanding of consumer behavior, particularly regarding new technology adoption in early-stage markets.

**Table 1.** Strengths and Weaknesses of the application of gen AI.

| Strengths | Weaknesses |
|---|---|
| AI improved logical flow and organization | AI lacked deep contextual understanding of the historical setting |

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| | |
|---|---|
| AI introduced new risk factors and alternative forecasting models | AI sometimes introduced generic forecasting principles rather than case-specific insights |
| AI helped refine argument structures and ensured responses were well articulated | AI's analysis required human oversight to filter out irrelevant or impractical suggestions |

Ultimately, AI served as a valuable collaborator in identifying forecasting pitfalls but was not a substitute for independent critical thinking. The students who best leveraged AI were those who used it to refine and enhance their own insights rather than relying on AI generated responses without modification.

## 6. Conclusions

AI contributed significantly to students' ability to analyze forecasting pitfalls, but its effectiveness depended on how it was used. When students engaged critically with AI generated responses—questioning its assumptions and contextualizing its insights—their analyses improved substantially. However, when students passively accepted AI outputs, they risked incorporating irrelevant or misleading information into their responses.

This study highlights AI's potential to augment business forecasting education, if it is treated as a collaborative tool rather than a definitive authority. Future research could explore ways to improve AI's ability to understand historical business contexts, making it an even more effective aid in case study analysis. The integration of AI in business forecasting education demonstrates both benefits and limitations. AI significantly improved the organization and depth of student responses, introducing additional perspectives and alternative analytical frameworks. However, AI's reliance on general knowledge sometimes resulted in irrelevant or overly simplified responses. Finally, it can be concluded that AI enhanced student analysis by broadening perspectives but required human oversight for contextual accuracy; AI-assisted forecasting provided structured arguments but occasionally lacked case-specific nuances; and Students viewed AI as a collaborator rather than a replacement for independent critical thinking. The findings suggest that Generative AI can serve as a valuable tool in business education, provided it is used as an aid rather than a substitute for human analysis. Future studies could explore how AI can be optimized to support more nuanced and context driven forecasting methodologies.

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