

The Role of Artificial Intelligence in Improving Project Budgeting and Pricing AccuracyAuthor: Theo Dayeh¹*Affiliation:*

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Abstract:

Artificial intelligence AI is being used more often in finance, especially for tasks that involve large amounts of information and repeated calculations. One area where it may be useful is project budgeting and pricing. Companies usually prepare project budgets using past information, spreadsheets, and the experience of financial professionals. Although these methods are still widely used, they can become less reliable when a project is complicated or when market conditions change. AI offers another way to approach these tasks by analyzing large datasets, identifying relationships between different variables, and using them to produce estimates.

This research compares traditional financial estimation methods with AI-supported approaches. The comparison looks at project cost estimation, budget accuracy, pricing decisions, and expected profit margins. Previous research suggests that AI-based models can reduce forecasting errors and make some parts of the estimation process faster. However, the results depend on the quality of the available data and on how the technology is implemented. Employee knowledge, implementation costs, and human review also remain important factors.

The findings therefore suggest that AI can be used as an additional tool in financial planning rather than as a replacement for financial professionals. When it is introduced into existing processes properly, it can reduce some of the repetitive work involved in financial analysis while leaving the final decisions to people with the necessary financial knowledge and experience.

Keywords:

Artificial Intelligence, Project Budgeting, Cost Estimation, Pricing Accuracy, Financial Forecasting, Machine Learning

Introduction:

Artificial intelligence has become increasingly relevant to the finance industry. Businesses are using AI to process information, support decisions, identify patterns, and make predictions about future conditions. One area where these capabilities can be useful is project financial management, particularly when companies need to prepare budgets or determine prices.

Budgeting and pricing are important for organizations working on client projects as well as for companies making internal investments. A project budget gives an estimate of the resources and costs required to complete the work, while pricing determines the amount that will be charged to the client or customer. Several factors can affect both decisions, including labor costs, project duration, resource requirements, market conditions, and the profit margin the company wants to achieve. When the original estimates are inaccurate, the project can end up costing more than expected or generating a lower profit.

For many years, companies have depended on historical data, spreadsheets, and the judgment of managers and financial professionals when making these estimates. These methods are not necessarily ineffective. In fact, experience can be particularly useful when dealing with unusual projects or situations that are difficult to represent numerically. The problem is that the amount of information involved can become difficult to manage, especially when conditions change. Simple mistakes, missing information, or unexpected changes in the market can also affect the final estimate.

The development of AI has introduced another possible approach. AI systems can use information from previous projects and examine relationships that may not be immediately obvious when the information is reviewed manually. They can also process large datasets much faster than a person working through spreadsheets. Deloitte (2024) identifies forecasting, budgeting, scenario analysis, and pricing as some of the areas where AI can be applied in finance. This suggests that technology has potential uses beyond purely technical or administrative tasks.

There are still important questions about whether the use of AI actually produces better financial estimates. The quality of the information given to an AI system is one of these concerns. If previous project data is incomplete or inaccurate, the results produced by the system can also be unreliable. Companies also need employees who understand how to use the technology and interpret its results. In addition, implementing an AI system can involve significant costs.

This research examines whether AI-supported financial estimation can improve project budgeting and pricing compared with traditional methods. The analysis focuses on four areas: project cost estimation, budget accuracy, pricing decisions, and expected profit margins.

The main question is:

Does the use of artificial intelligence improve the accuracy of project budgeting and pricing decisions compared with traditional financial estimation methods?

To address this question, the study has five main objectives:

Examine the role of artificial intelligence in project budgeting and cost estimation.

Compare AI-based cost estimates with traditional budgeting methods.

Analyze how AI can affect pricing accuracy and expected profit margins.

Identify the main benefits and challenges associated with using AI in project financial management.

Provide recommendations for organizations considering AI for budgeting and pricing.

This topic is relevant to Finance and Business Administration because budgeting and pricing decisions have a direct connection with profitability and the allocation of resources. It also raises

an important question for financial professionals: how can new technology be used to improve financial work without removing the importance of professional judgment?

Literature Review:

AI has received increasing attention in financial and business research. Researchers have examined its use in areas such as forecasting (Subrahmanyam et al., 2024; El-Chaarani et al., 2025) and predicting economic quadrants (Nasser et al., 2025), decision-making (Khalife et al., 2024), cost management, and operational efficiency. The growth of machine learning and data analysis tools has made it possible to work with much larger datasets than would normally be practical through manual analysis and revolutionized practices such as audit (Sawaya et al., 2026 ; Saber & Sassine, 2022) and had positive externalities even outside the realm of finance such as ESG (Kaspard et al., 2026). Financial planning and forecasting are among the areas where AI has received considerable attention. Traditional forecasting usually starts with historical information and relies on the judgment of the person preparing the forecast. This can work reasonably well when future conditions are similar to previous ones. It becomes more difficult when the market changes quickly, especially when these shifts are not based on numbers but on investor sentiments (Khalife et al., 2025). AI can take historical financial information and combine it with other variables when producing forecasts (Bejjani et al., 2024). Deloitte (2024) describes forecasting, predicting financial distress (Elia et al., 2021), budgeting, scenario analysis, investing (Athari et al., 2026), and decision-making that boosts entrepreneurial achievements (Chaanine et al., 2023) as potential applications of AI within finance.

Project cost estimation is another area where machine learning has been studied. Accurate cost estimates are important because even relatively small errors can become significant when they are repeated across a large project and this is specifically useful given today's data driven culture (Azoury et al., 2024). Traditional estimates often use previous projects as a reference and depend heavily on the experience of managers. Machine learning approaches can instead examine historical project data and look for relationships between project characteristics and the final cost. Research in project management suggests that machine learning models can consider several factors at the same time when estimating costs. Examples include project size, duration, labor requirements, material requirements, and information from previous projects. This gives the model the ability to look at the project from several angles rather than depending mainly on one person's experience.

Subrahmanyam and Beainy (2027) argue that technology enables smarter decisions. Pricing is another area where AI technology is being applied. The price of a product or service can be influenced by customer demand, competitors, market conditions, and previous sales. Because these factors can change, companies may need to update their pricing decisions relatively quickly. AI-based systems can process these variables together and provide information that can be used when adjusting prices. Research into AI-based pricing has found applications across different industries, particularly in demand forecasting and pricing adjustments. Deloitte also identifies pricing as an area where AI can support finance professionals (Deloitte, 2024).

However, the potential benefits of AI do not mean that technology will always produce reliable results. Data quality is a major concern. An AI model trained using incomplete or inaccurate historical information may produce estimates that are also inaccurate. The same problem can occur when the historical data does not represent the type of projects the company will be dealing with in the future. Research on machine learning for project cost estimation has also identified

difficulties related to the availability of suitable project data and applying models to different types of projects.

There is also a human side to implementation. Employees need to understand what the system is producing and know when the results should be questioned. A financial professional may notice a change in a project or a client relationship that is not included in the available data. Many support the idea that AI should be used as a support tool rather than treated as a complete substitute for professional judgment.

Overall, previous research shows that AI has applications in cost estimation, forecasting, and pricing. At the same time, much of the existing research focuses on particular industries, especially construction and technical project management or specific assets (Beainy & Kamel, 2026), especially Cryptocurrencies. There is less emphasis on looking at budgeting and pricing together from a broader financial management perspective. This study focuses on that connection by comparing traditional and AI-supported approaches and considering their possible effects on cost accuracy, pricing decisions, and profit margins.

Methodology:

This study uses a comparative approach to examine traditional financial estimation methods alongside AI-supported methods. The purpose is not to argue that one method should completely replace the other, but to look at how they differ in terms of accuracy and efficiency.

The comparison covers four areas: project cost estimation, budget accuracy, pricing decisions, and expected profit margins. Traditional estimation refers mainly to methods based on historical information, spreadsheets, and professional judgment. AI-supported estimation refers to the use of AI to analyze historical data, identify patterns, and produce financial estimates.

Several factors are considered in the comparison. These include the expected project cost, the difference between estimated and actual costs, the resulting budget variance, and the effect of different estimates on the final price and profit margin. The amount of time required to process the information is also considered. In addition, the reliability of AI estimates is examined by considering factors such as the quality of the data and the need for human review.

The research relies mainly on secondary information from academic research and professional reports dealing with artificial intelligence, financial forecasting, project cost estimation, and pricing. These sources are used to identify the advantages and limitations associated with AI-supported estimation. Since AI-generated results can contain errors or fail to account for information outside the dataset, human judgment is also considered as part of the financial decision-making process.

Results:

The research indicates that AI-based models can improve project cost estimation in certain situations. One example comes from research comparing an XGBoost model with a traditional index-based model. The XGBoost model produced average percentage errors ranging from 6.22%

to 9.70%, compared with 14.35% to 17.43% for the traditional model (Mousavi et al., 2024). The difference between the two approaches suggests that machine learning can reduce forecasting errors when sufficient and reliable project data is available.

Pricing decisions can also benefit from the ability of AI systems to process several variables together. Demand, previous sales, market conditions, and competitor prices can all affect the price a company chooses. Rather than examining these factors separately, an AI-based system can look for relationships between them and provide information that may help when prices need to be adjusted. Research on AI-powered pricing has shown that these technologies are being used in different industries, although the results vary depending on the situation and the quality of the data. Another difference between the two approaches concerns the time required to process information. Traditional estimation can involve collecting information, preparing spreadsheets, checking previous projects, and updating forecasts manually. Some of these tasks can be automated with AI. This does not necessarily mean that the entire financial process becomes automatic, but it can reduce the amount of time employees spend on repetitive calculations and data processing.

The results also show why human involvement remains important. An estimate can only be as useful as the information behind it. If the historical data is incomplete or contains errors, an AI model can produce misleading results. There are also aspects of financial decision-making that may not be easy to include in a model. For example, a change in project scope, a particular client relationship, or an unexpected market event may require a professional to reconsider an estimate. For this reason, the findings support the use of AI as a tool that assists financial professionals. It can provide additional analysis and reduce some of the manual work, but the final decision should still involve people who understand the project and the financial context surrounding it.

Taken together, the findings support the research question. AI-supported methods have the potential to improve cost-estimation accuracy and provide useful information for pricing decisions. However, the benefits depend on the quality of the data and the ability of employees to understand and review the results.

Discussion and Conclusion:

This study examined the possible role of artificial intelligence in project budgeting and pricing. The comparison between traditional financial estimation and AI-supported approaches focused on cost estimates, budget accuracy, pricing decisions, and expected profit margins.

The research suggests that AI can be useful when estimating project costs, particularly when there is enough reliable historical data to train and support the model. The XGBoost example discussed in the results section showed lower forecasting errors than the traditional index-based approach. AI can also process information related to demand, market conditions, and previous sales when supporting pricing decisions.

There are still limitations to consider. AI does not automatically make an estimate accurate simply because it can process more information. Poor-quality data can lead to poor results, and employees need the appropriate knowledge to understand what the system is producing. Implementation costs and internal controls are also important when a company considers introducing AI into its financial processes.

Based on the findings, AI is more realistically viewed as a complement to traditional financial work rather than a replacement for financial professionals. Its ability to process information quickly can be combined with the experience of people who understand the project, the client, and

the wider business environment. This combination may allow companies to spend less time on repetitive analysis while still keeping human judgment involved in important financial decisions. Future research could examine the use of AI in particular industries and use larger real-world project datasets. This would make it possible to measure more precisely how much AI changes budgeting and pricing accuracy under different project conditions.

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