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PLANNING AND DECISION-MAKING IN THE EARLY STAGES OF BUSINESS: APPLYING EXCEL'S GOAL SEEK TOOL IN SMALL ENTERPRISES

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ABSTRACT

In the early stages of business, small businesses often do not have access to advanced analytical tools for planning and making business decisions. Using the functionalities available in Microsoft Excel, such as Goal Seek, it is possible to efficiently analyze key business parameters. The paper shows how managers can apply this tool to make better decisions in planning and achieving the desired financial result, without the need for advanced knowledge in the field of analytics. Goal Seek allows, knowing the desired outcome, to reach the goal by mathematically adjusting one predetermined variable within the equation. The results indicate the importance of using simple technological tools in improving efficiency among small business owners and in management studies.

KEY WORDS: *Excel, What-If Analysis, Goal Seek, financial planning, decision-making, small enterprises, business analysis*

PLANIRANJE I DONOŠENJE ODLUKA U RANOJ FAZI POSLOVANJA: PRIMENA EXCEL GOAL SEEK ALATA U MALIM PREDUZEĆIMA

SAŽETAK

U ranim fazama poslovanja, mala preduzeća često nemaju pristup naprednim analitičkim alatima za planiranje i donošenje poslovnih odluka. Korišćenjem funkcionalnosti dostupnih u Microsoft Excel-u, kao što je Goal Seek, moguće je efikasno analizirati ključne poslovne parametre. Rad pokazuje kako menadžeri mogu primeniti ovaj alat za donošenje kvalitetnijih odluka u planiranju i postizanju željenog finansijskog rezultata, bez potrebe za naprednim znanjem iz oblasti analitike. Goal Seek omogućava da se, znajući željeni ishod, do cilja dođe matematičkim

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prilagođavanjem jedne, unapred određene promenljive unutar jednačine. Rezultati ukazuju na značaj korišćenja jednostavnih tehnoloških alata u unapređenju efikasnosti među vlasnicima malih biznisa i u studijama menadžmenta.

KLJUČNE REČI: *Excel, What-If analiza, Goal Seek, finansijsko planiranje, donošenje odluka, mala preduzeća, poslovna analiza*

INTRODUCTION

In today's dynamic financial environment, effective decision-making is critical to the success of an organization. Excel spreadsheets have long been indispensable tools for financial professionals, as they facilitate data analysis, modeling, and decision support (Kumar & Prasath, 2024). Among small business owners, there is a pronounced need for decision-making tools that combine ease of use with sufficient technical capabilities for analyzing business scenarios. This work is just such a tool. The proposed solution is based on the use of Excel's What-if Analysis functionality and Goal Seek tool to support decision making. The Goal Seek function, which spreadsheet users often describe as "what-if in reverse" solves the nonlinear function of a single variable for a given value (Fylstra et al., 1998). Although it is used in various business spheres, it is most often used for financial modeling purposes. One of the most common examples is the calculation of the interest rate needed to achieve defined loan installments, the determination of monthly savings to reach the future financial goal, the determination of the budget needed to complete the project within a certain time period, or the calculation of the amount of resources needed to complete the tasks within the set deadlines (Williams, 2024).

Despite the importance of the topic, empirical research that directly examines the connection between Goal Seek tools and decision-making outcomes is limited. This study aims to fill this gap by presenting a simulation and illustrative example to demonstrate the functionality of the Goal Seek tool in coverage point analysis and profit planning. Also, despite the widespread use of Exel, its potential does not seem to be fully utilized, and there are still unknowns about the tools that Excel provides. For this reason, the research aims to highlight the importance of user training by emphasizing the need for organizations to invest in quality training programs to empower users with the skills and knowledge necessary to create high-quality tables and identify errors before they grow into serious problems (Kumar & Prasath, 2024). In this way, organizations can improve the process of making financial decisions, increase success and achieve sustainable growth and competitive advantage in a modern, dynamic financial environment. The study is therefore suitable for both small business owners, as well as analysts and other users who use Excel in their work, especially in the context of making better decisions.

LITERATURE REVIEW

Managers are known for their decision-making abilities. Regardless of whether the organization is engaged in the production of products or the provision of services, the importance of making the right decision cannot be overestimated. Decision-making was further complicated by globalization and the internet revolution of the 1990s. In particular, these phenomena have significantly increased the amount of information available

to decision-makers. Managers are often overwhelmed with data, while at the same time they have to react to decision-making situations in a short time. Although there are technologically advanced commercial solutions to many decision-making problems, managers often feel uncomfortable due to the technical complexity needed to implement them (Aggarwal, 2004).

As a key part of the Microsoft Office suite, Excel is a very popular decision-making tool due to its versatility. It is useful for processing numerical data, creating charts, automating tasks using macros, and allowing data to be imported in several different formats (Aggarwal, 2004). Excel tables are widely used in organizations (McLean et al., 1993; Scaffidi et al., 2005). Every year tens of millions of managers and professionals around the world create hundreds of millions of spreadsheets (Panko, 2008). They have become integral tools in making financial decisions thanks to their versatility and accessibility. In a variety of industries, from small businesses to large corporations, Excel is used for tasks ranging from simple calculations to complex financial analysis (Kumar & Prasath, 2024). This basic ability explains its wide application in industries, regardless of the size and complexity of the organization. They allow users to organize, analyze and present financial data in a structured way, facilitating various aspects of decision-making, including budgeting, forecasting and financial analysis.

Its ubiquity highlights the key role it plays in shaping financial strategies and optimizing resource allocation (Kumar & Prasath, 2024). However, the effectiveness of Exel in making financial decisions largely depends on the understanding of the tables. In this way, it is very important to know the proper use of this tool in order to minimize the possibility of error. There is no typical spreadsheet developer, as their creation allows flexibility to different professionals (Thorne & Ball, 2008). Most are end-user developers who do not have formal training in information systems or software engineering, and often develop spreadsheets ad-hoc and chaotic (Gosling, 2003). What all Excel table users have in common is that they face the problem of errors (Powell et al., 2008). Especially bearing in mind that spreadsheets in an organizational context generally do not exist in isolation, but represent organizational assets shared by different persons (Smith et al., 2017). Table errors are thought to be common (Panko & Halverson, 1996), and in some cases cost organizations millions of dollars (Powell et al., 2008). Mistakes can result from inadequate table design and can cause serious consequences, from financial losses to reputational damage. Inaccurate data or miscalculations can lead decision makers to the wrong course of action, which can be distanced from organizational goals (Kumar & Prasath, 2024).

Frequent challenges and problems identified are errors in formulas, which can occur due to careless typing, lack of knowledge in the field, lack of knowledge from the Index, including erroneous cell references (which may arise due to a later user changing the formula or for an unknown reason), logical omissions and computer inaccuracies (Powell et al., 2008). Other problems arise in connection with the validation of data and the duplication of multiple versions of the same table. Version control issues pose a serious challenge in managing Excel tables because in the absence of strong version control protocols, process participants can inadvertently rely on outdated versions. Other bad practices include limited or non-existent documentation, duplicate input data, illogical layout, tables made under heavy time pressure, organic design (either the table design is inherited from the previous table, or the table "grew" organically during the project, without ever being consciously

designed), the table designer did not know from the beginning what the table would be used for to design it more convenient and more (Powell et al., 2008).

There are numerous studies that indicate the frequency of errors in spreadsheets (e.g., Panko & Halverson, 1996; Purser & Chadwick, 2006; Rajalingham et al., 2000). Powell et al. (2008) have identified the following six types of errors (p.60) due to their audit experience:

1. Logic error - the formula was used incorrectly, resulting in an incorrect result.
2. Referential error - a formula contains one or more wrong references to other cells.
3. Hard-coding numbers in a formula – one or more numbers appear within formulas, and the practice is risky enough.
4. Copy/Paste Error - The formula is incorrect due to incorrect use of copy/paste.
5. Data Entry Error - Wrong data entry used.
6. Omission error - the formula is wrong because one or more of its input cells is empty.

In an earlier study, Powell et al. (2006) identified hard-coding as the most common bad practice. The problem with hard coding is that values are entered directly into the code or into the cells, instead of using references to other cells or formulas that automatically count. In this way, the risk of error increases, and if something changes later in the table, it is necessary to manually update all entered values. The importance of understanding potential mistakes is important because these mistakes can spread throughout the table, leading to miscalculations and misinterpretation of the data, thus endangering the validity of financial analyzes and strategic assessments. Incomplete or inconsistent data entry, either due to human error or insufficient validation protocols, can distort decision-making outcomes (Kumar & Prasath, 2024).

Powell et al. research findings. (2008, p.62) lead to the following:

- Some organizations use tables that are virtually error-free.
- Within one organization, the practice of working with tables can vary from excellent to bad.
- Some organizations use tables full of errors, some of which are notable for their size.
- Many mistakes have no impact or affect irrelevant calculations.
- There is a small correlation between the importance of the application or risk involved and the quality of the table.
- Few tables contain errors that, in the opinion of their authors, would destroy their usability.

Decision makers rely on tables not only to turn complex data into actionable insights, but also to convey information in a clear and compelling way. Therefore, tables that lack clarity or fail to convey information threaten the credibility of the decision-making process, making it difficult for the organization to cope with strategic challenges (Kumar & Prasath, 2024). All this leads to chaotic design and the appearance of errors related to the poorly structured physical arrangement of formulas and data. In conclusion, in the hands of experts, complex formulas can be used very effectively, while in the hands of beginners the same formulas can be prone to errors (Powell et al., 2008).

In order to ensure the reliability of the tables, it is crucial to adhere to best practices, where high-quality training of users for the use of table software is primarily necessary.

In this way, by instilling a sense of responsibility for the accuracy and integrity of data in tables, organizations can foster a culture of conscientiousness in which users are proactive in identifying and correcting errors before they grow into serious problems (Kumar & Prasath, 2024). Then users will acquire the necessary skills to create and handle tables, such as primarily standardizing layouts and formatting conventions that make data more readable and easier to understand, then naming ranges to increase clarity and ensure the accuracy of formulas and calculations, as well as applying conditional formatting and validation that limit data entry to predefined parameters (Kumar & Prasath, 2024). After acquiring basic knowledge, it is desirable that users continuously work and improve their skills to improve productivity and optimize the reliability of financial analysis and strategic assessments. At a more advanced level of knowledge of Excel, users and businesses include What-if analysis tools in their financial planning and decision-making processes.

What-if analysis is a common data analysis technique that allows users to test different scenarios to determine the range of possible outcomes without altering the actual data. It is useful in financial modeling, forecasting and other business applications where backward calculations are needed. While other What-If analysis tools, such as Data Tables or Scenario Manager, consider multiple variables, Goal Seek focuses on adjusting one variable to achieve the desired outcome (Thevapalan, 2024). Goal Seek is a method of solving a problem in order to get the desired result, by changing the assumption that determines it. The function uses the trial and error approach to resolve the problem backwards, inserting assumptions until the correct answer is reached (Vipond, n.d.). The Goal Seek tool is widely used in business, from performing basic engineering analyzes of thermal-fluid systems that require iterative solutions (El-Awad, 2016) to financial modeling and academic studies.

Its main applications include (Thevapalan, 2024):

- Budget forecast: Determination of the required savings or investments to achieve the financial objective.
- Loan repayment: Calculation of the eligible loan amount based on a fixed monthly installment.
- Coverage point analysis: Determining the sales needed to cover costs and reach break-even.
- Calculating grades: Determining the required result in the final exam to achieve the target grade.
- Targeted Average Ratings (GPAs): Calculation of required grades on future cases to reach or maintain the desired average.

In order to use the Goal Seek tool in the Model, it is necessary to have a formula (equation) that connects input and output values. Goal Seek allows you to numerically determine which input value gives the desired result of a formula, for example, when we have the profit equation as a sales function and want to know when the business will reach the point of coverage. On the second occasion, we want to find out what input value gives the desired result (e.g., how many units of a product do we need to sell to achieve $100,000 in commission?) (May & Bart, n.d.).

In economics, there are notions of supply and demand prices, that is, prices that produce a certain amount of supply or demand (Mau & Bart, n.d.). As an example, May &

Bart (n.d.) states that the goal is to find the quantity q at which the prices of supply and demand are equal:

Supply Price (q) = ln (50 + 1000q) + q

Demand Price (q) = 1000 * exp (-0.02 * q)

Furthermore, to make this a problem for Goal Seek, a column is added to the difference between the price of supply and the price of demand and a place is sought where that difference is zero. Goal Seek provides a solution q = 106.725. This solution could also be found algebraically by solving the equation:

0 = 1000 * exp (-0.02 * q) - (ln (50 + 1000 * q) + q

but this is not an easy problem to solve manually (Mau & Bart, n.d.). Goal Seek enables fast and precise numerical determination of solutions without the need for complex algebraic calculations.

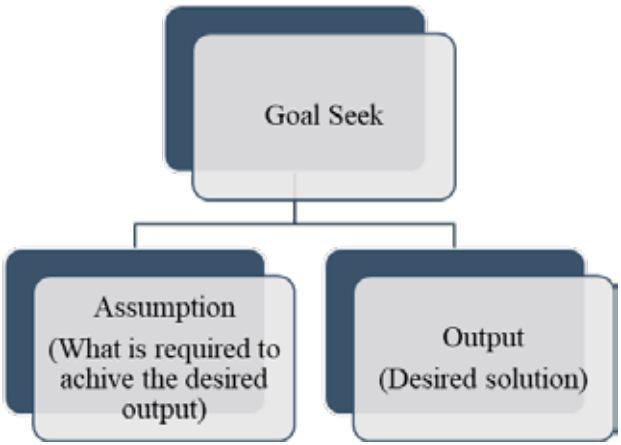
METODOLOGY

The methodology is fully transferable across different industries for similar decision-making situations. The application of Goal Seek in data models usually involves three repeatable steps (Thewapalan, 2024). First, data and formulas are prepared, and checked so that Excel can interpret them correctly. It is very important that the formula to be solved is properly connected to the input cell that will be changed. Then a cell is selected with a formula whose result needs to be adjusted. The Data → What-If Analysis → Goal Seek menu is left and entered: a cell with a formula (Set cell), the desired result (To value) and an input cell that changes (By changing cell). By clicking OK, Excel automatically calculates the required input cell value so that the formula result reaches the defined target value. The third step involves analyzing the results. After the execution of the Goal Seek operation, Excel automatically adjusts the input cell to achieve the desired result. The resulting result allows you to perceive the impact of the change in input data on the target outcome, which facilitates decision-making and predicting outcomes in different scenarios.

RESULTS

Before using the Goal Seek tool, it is necessary to have a clearly defined desired outcome (Figures 1). In this way, it is possible to set realistic and achievable goals within the data model. Accurate knowledge of the results to be achieved enables efficient use of tool capabilities, thus improving the decision-making process and increasing productivity (Corporate Finance Institute (CFI) Team, n.d.).

Figures 1. Model structure



Source: Corporate Finance Institute (CFI) Team. (n.d.).

Businesses can use Goal Seek to find the sales volume needed to cover costs and reach the point of coverage. Goal Seek can adjust the amount of sales or price by setting the profit to zero to determine the point of coverage (Thevapalan, 2024). In the following simulation, we show the application of the Goal Seek tool in the context of a small company with four employees selling online courses (Table 1). By way of example, we analyze how this tool can calculate the number of participants needed to achieve zero profit or planned financial result. All items in the simulation shown are roughly defined to demonstrate the functionality of the Goal Seek tool in coverage point analysis and profit planning.

Table 1. Goal Seek Application for Determining the Break-even Point

Financial Item	**Amount (€)**	**Calculated results**
Number of course participants	15	=C5
Course fee	350	=C6
Total revenue	**5,250**	=C5*C6
Cost per unit sold	1.5	=C8
Variable cost	**23**	=C5*C8
Rent + utilities	650	=C10
Internet and phone	80	=C11
Software licenses	120	=C12
Salaries for 4 employees (net)	3,600	=C13
Taxes and contributions (~60%)	2,160	=C13*0.6
Accounting services	100	=C15
Marketing	140	=C16
Fixed costs	**6,850**	=C10+C11+C12+C13+C14+C15+C16
Total costs (variable + fixed)	**6,873**	=C9+C17
Profit	**-1,623**	=C7-C18

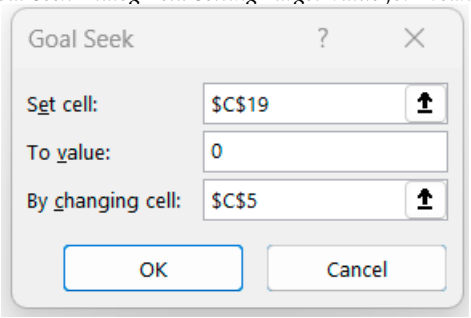
Source: Author's own calculations

The presented model of the table shows that with the current number of 15 participants and the course price of €350, the company achieves a negative financial result of –€1,623, which indicates that the point of coverage has not yet been reached.

What needs attention when forming a model is that the target cell must be the result of a formula (in this case, it is cell C19 = Profit), while the variable must not be a formula (C5 = Number of course participants). It is also important that there is a link between the cell that displays the number of course participants and the cell that displays the profit, which is shown in Table 1.

When the model is prepared, it goes to the Data tab, then What-If Analysis and Goal Seek are selected. The dialog window shown in Figure 2 opens, which in an intuitive way allows you to define the target value we want to achieve.

Figure 2. Excel Goal Seek Dialog Box: Setting Target Value for Break-even Simulation



Source: Author's own calculations

In the Goal Seek dialog window, cell C19 is marked in the Set Cell box, which contains the formula for calculating profit. In the To value field, a value of 0 is set, because we want to identify the point of coverage. As a variable cell in the By changing cell field, cell C5 is selected, representing the number of course participants. After OK, Goal Seek automatically changes the value in C5, testing the different numbers until it finds the value that leads to zero profit in C19 (Picture 1).

Picture 1. Launching Goal Seek Tool

Application of the Excel Goal Seek Tool for Determining the Break-even Point		
Financial Item	**Amount (€)**	**Calculated results**
Number of course participants	20	=C5
Course fee	350	=C6
Total revenue	6,879	=C5*C6
Cost per unit sold	1.5	=C8
Variable cost	**29**	=C5*C8
Rent + utilities	650	=C10
Internet and phone	80	=C11
Software licenses	120	=C12
Salary for 4 employees (net)	3,600	=C13
Taxes and contributions (~60%)	2,160	=C13*0.6
Accounting services	100	=C15
Marketing	140	=C16
Fixed cost	6,850	=C10+C11+C12+C13+C14+C15+C16
Total cost (variable + fixed)	6,879	=C9+C17
Profit	0	=C7-C18

By applying the Goal Seek function, it was determined that 20 course participants were required to achieve the coverage point. In this case, total revenues (€ 6879) are equated with total costs (€ 6879), thus achieving zero profit. Also, it can be used in situations where the desired result of the formula is known (for example, the goal of € 5,000 profit), but the input value needed to achieve it is not known.

CONCLUSION

In the simulation shown, this tool precisely determines the number of course participants needed to reach the break point. The modeling technique presented in this study can be applied in different industries for similar decision-making situations (Aggarwal, 2004). When decision makers know inputs and outputs, they can easily use Excel's tools like Goal Seek, which allows them to quickly test different scenarios and make better financial decisions.

The changes that can be identified are diverse, including profitability indicators (whether gross, operating or net profit) and cash flow indicators (operating, free and net flow). Based on such analyzes, decision makers can monitor how a change in one parameter affects others (for example, a price increase can lead to a decrease in sales volume or vice versa). In doing so, it is important to consider which of these parameters are realistically feasible and to what extent, which answers the question: "How to reach the goal?" (Gomez, 2020).

The principle of operation of this tool is based on the reverse process: the user defines the desired outcome, and Excel automatically adjusts the input variable to find the appropriate solution. It is important to know that the tool works with only one variable input value. If the needs of the analysis are more complex and more than one input value needs to be used, such as for example the loan amount and the monthly installment amount, then the Solver tool is used. Given that spreadsheet users see Excel Solver as a more powerful successor to the Goal Seek function (Person, 1997), it is desirable to include it in further studies.

In conclusion, the results of the simulation indicated that the Goal Seek function is a reliable tool for identifying parameters that can be changed in order to achieve financial goals, especially in an unstable economic environment. However, it is important to emphasize that the successful application of this tool requires a good knowledge of the Model and its basic functions, in order to avoid possible mistakes when creating a model.

LITERATURE

- Aggarwal, A. K. (2004). An excel-based decision-making tool. Problems and Perspectives in Management, 2(2), 309-318.
- Corporate Finance Institute (CFI) Team. (n.d.). Goal Seek Excel: A what-if analysis tool used to find the value of an assumption based on the desired output. https://corporatefinanceinstitute.com/resources/excel/goal-seek-excel/
- El-Awad, M. (2016). Use of Excel's 'Goal Seek' feature for thermal-fluid calculations. Spreadsheets in Education (eJSiE), 9(3).
- Fylstra, D., Lasdon, L., Watson, J., & Waren, A. (1998). Design and use of the Microsoft Excel Solver. Interfaces, 28(5), 29–55. https://doi.org/10.1287/inte.28.5.29
- Gomez, A. (2020, April 29). Business Unusual Series: #8 Move the levers with Goalseek. Fathom. https://www.fathomhq.com/blog/business-unusual-series-8-move-the-levers-with-goalseek

- Gosling, C. (2003). To what extent are systems design and development techniques used in the production of nonclinical corporate spreadsheets at a large NHS trust (Unpublished MBA thesis). University of Wales Institute Cardiff (UWIC) Business School.
- Kumar, S., & Prasath, S. G. (2024, March). The impact of Excel spreadsheet design on financial decision making. Shanlax International Journal of Management, 11(S1-Mar), 176–184. https://doi.org/10.34293/management.v11iS1-Mar.8040
- May, M. S. J., & Bart, A. (n.d.). 1.6 Finding numerical solutions with Goal Seek. In Business Calculus with Excel. Retrieved August 22, 2025, from https://mathstat.slu.edu/~may/ExcelCalculus/sec-1-6-GoalSeek.html
- McLean, E. R., Kappelman, L. A., & Thompson, J. P. (1993). Converging end-user and corporate computing. Communications of the ACM, 36(12), 79–92.
- Panko, R. (2008). Spreadsheet errors: What we know. what we think we can do. Arxiv Preprint ArXiv:0802.3457.
- Panko, R. R., & Halverson, R. H., Jr. (1996). Spreadsheets on trial: A framework for research on spreadsheet risks. In Proceedings of the Twenty-Ninth Hawaii International Conference on System Sciences (Vol. II, pp. 326–335). Kihei, Maui, HI, USA.
- Panko, R., & Halverson, R. (1996). Spreadsheets on trial: A survey of research on spreadsheet risks. In Proceedings of the 29th Annual Hawaii International Conference on Systems Sciences (pp. 326–335).
- Person, R. 1997, Using Microsoft Excel 97, QueCorp./Macmillian Computer Publishing, In-dianapolis, Indiana.
- Powell, S. G., Baker, K. R., & Lawson, B. (2006). Errors in operational spreadsheets. Spreadsheet Engineering Research Project working paper.
- Powell, S. G., Lawson, B., & Baker, K. R. (2008). Impact of errors in operational spreadsheets. arXiv. https://arxiv.org/abs/0801.3114
- Purser, M., & Chadwick, D. (2006). Does an awareness of differing types of spreadsheet errors aid end-users in identifying spreadsheet errors? In Proceedings of the European Spreadsheet Risk Interest Group Annual Conference (pp. 185–204). Cambridge, UK.
- Rajalingham, K., Chadwick, D., & Knight, B. (2000). Classification of spreadsheet errors. In Proceedings of the European Spreadsheet Risks Interest Group Annual Conference (pp. 23–34). Greenwich, UK.
- Scaffidi, C., Shaw, M., & Myers, B. (2005). Estimating the numbers of endusers and end user programmers. In Visual Languages and Human-Centric Computing (pp. 207–214).
- Smith, J., Middleton, J. A., & Kraft, N. A. (2017). Spreadsheet practices and challenges in a large multinational conglomerate. In 2017 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC) (pp. 1-9). https://doi.org/10.1109/VLHCC.2017.8103463
- Thevapalan, A. (2024, September 5). How to use Goal Seek in Excel: A guide with real examples. DataCamp. https://www.datacamp.com/tutorial/goal-seek-excel
- Thorne, S., & Ball, D. (2008). Exploring human factors in spreadsheet development. arXiv.
- Vipond, T. (n.d.). Goal Seek: Back-solve a solution with this Excel function. Corporate Finance Institute. Retrieved August 18, 2025, from https://corporatefinanceinstitute.com/resources/excel/goal-seek-excel-guide/
- Williams, K. L. (2024, December 1). Using Excel's Goal Seek for data analysis. Journal of Accountancy. https://www.journalofaccountancy.com/issues/2024/dec/using-excels-goal-seek-for-data-analysis/