Available online at: http://publikasi.mercubuana.ac.id/index.php/ijiem

IJIEM (Indonesian Journal of Industrial Engineering & Management)

ISSN (Print) : 2614-7327 ISSN (Online) : 2745-9063

A Systematic Review of the Simplex Method in Profit-Oriented Optimization for Manufacturing Industries

Enita Pasaribu[1], Hernadewita[1], Fransisca Debora[2*], Yusita Attaqwa[3]

[1] Industrial Engineering Department, Mercu Buana University, Jln. Meruya Selatan No.1, Kembangan, Jakarta 11650 Indonesia

[2] Industrial Engineering Department, Universitas Singaperbangsa Karawang, Jl. HS.Ronggo Waluyo, Karawang, Jawa Barat 41361 Indonesia

[3] Industrial Engineering Technology Management, Bandung Polytechnic for Manufacturing, Jl. Kanayakan No.21, Dago, Kecamatan Coblong, Kota Bandung, Jawa Barat 40135 Indonesia

ARTICLE INFORMATION

Article history:

Received: 30 July 2025
Revised: 30 September 2025
Accepted: 2 October 2025

Category: Review paper

Keywords:
Simplex method
Linear programming
Profit optimization
Manufacturing industry

DOI: 10.22441/ijiem.v6i3.35105

A B S T R A C T

Companies involved in production activities consistently strive to achieve their strategic objectives, with profit maximization being one of the primary goals for maintaining competitiveness and ensuring long-term business sustainability. This goal can be pursued through optimal production planning, one of which involves the application of the Simplex Method (SM). The Simplex Method is a mathematical algorithm designed to solve Linear Programming (LP) problems, which focus on optimizing a linear objective function while accounting for various resource-related constraints. This paper presents a systematic literature review on the implementation of the Simplex Method for profit optimization in the manufacturing sector. A total of 30 relevant research articles published between 2019 and 2024 were analyzed, sourced from reputable academic databases such as Google Scholar and ScienceDirect. The findings demonstrate that the Simplex Method offers substantial benefits, including improved resource allocation, cost reduction, enhanced decision-making capabilities, increased productivity, and support for data-driven operational efficiency. These advantages underscore the method's effectiveness as a quantitative decision-support tool in strategic industrial planning. The review also highlights the broad applicability of the Simplex Method across various countries and industrial sectors, particularly in food, automotive, chemical, and textile manufacturing. As the manufacturing landscape transitions into the era of Industry 4.0, it is strongly recommended that future research explores the integration of the Simplex Method with emerging technologies such as Big Data analytics, Artificial Intelligence (AI), Cyber-Physical Systems (CPS), and Hybrid Optimization Models to further enhance industrial competitiveness, adaptability, and sustainability.

*Corresponding Author

Fransisca Debora
E-mail: fransisca.debora@ft.unsika.ac.id

1. INTRODUCTION

In the highly competitive manufacturing industry, companies continuously strive to optimize resource allocation in order to maximize profits. One of the most effective tools for addressing this challenge is Linear Programming (LP), a mathematical technique that aids decision-making by optimizing an

objective function under various constraints. Among the various methods used to solve LP problems, the Simplex Method developed by George Dantzig in 1947 stands out as a powerful and widely adopted algorithm. Among the methods used to solve LP problems, the Simplex Method, developed by George Dantzig in 1947, stands out as a powerful and widely adopted algorithm for process integration and optimization. The Simplex Method identifies targets and leverages synergies across the production process, aiming to minimize energy and raw material consumption while reducing waste generation and environmental impact.

Process optimization seeks to enhance both the design and operation of industrial systems by maximizing performance and minimizing production costs through the application of mathematical and computational techniques (Florez-Orrego et al., 2022). The Simplex Method provides a systematic approach for finding optimal solutions to problems involving the maximization or minimization of linear objective functions. Through an iterative process, it progressively improves the value of the objective function to reach an optimal solution. Recognized as one of the most significant innovations of the modern era, the Simplex Method has broad applications in solving business-related problems. In practice, industries frequently encounter complex decision-making scenarios, such as determining the most profitable product mix, optimizing production schedules, and reducing operational expenses. The Simplex Method offers a structured approach to these challenges, enabling manufacturers to make efficient use of limited resources.

For instance, a company may need to allocate resources across multiple production lines to maximize total profit while satisfying constraints related to machine capacity, labor availability, and material supply. This literature review seeks to explore the application of the Simplex Method in profit optimization within the industrial sector. By analyzing practical case studies and reviewing the advantages of the Simplex Method, this paper aims to demonstrate how this method can be used effectively to improve the decision-making process and increase overall operational efficiency as per previous studies (Setiawan et al., 2020) (Setiawan & Purba, 2020).

2. LITERATURE REVIEW

2.1 Linear Programming

Linear programming (LP) or Linear Optimization can be defined as a problem of maximizing or minimizing a linear function that has linear constraints. The constraints can take the form of equations or inequalities. Optimization problems involve calculating profits and losses. LP problems are an important class of optimization problems that aim to optimize solutions to achieve the highest or lowest value of the function. This ability began in 1947 and has continued to evolve alongside the extraordinary growth in computing power (Dantzig, G. B., & Thapa, 2003) LP has wide-ranging applications across various industries.

According to (Saha et al., 2015) this type of model is referred to as a Linear Programming (LP) model and is represented as follows:

Minimize (or Maximize): $$Z = \sum_{J=1}^{n} c_j \; x_j \quad (1)$$

Subject to:

$$\sum_{j=1}^{n} a_{ij} x_j \{\leq, =, \geq\} b_j \; ; i = 1,2,..,m$$

$$; x \geq 0; b \geq 0 \quad (2)$$

Where, one of signs (≤, =, ≥ hold for specific constraint and differ from the sign of the other constraints.

In manufacturing, LP is used for resource allocation, production planning, and supply chain optimization (Hopp, W. J., & Spearman, 2011). Companies use LP to optimize product mix and maximize profit under constraints like labor, raw materials, and machine availability. In the transportation sector, LP is applied to minimize transportation costs and develop efficient routing systems (Dantzig, G. B., & Thapa, 2003). In finance, LP helps in portfolio optimization by determining the best asset allocation to maximize returns while minimizing risk under given constraints (Markowitz, 1952).

2.2. Simplex Method

The Simplex method is a popular algorithm used to solve linear programming problems. SM was first introduced by George Dantzig to solve large scale LP problems. SM is an approach to solve LP models using tableaus, slack variables and pivot variables as means to find the optimal solution of a constrained linear problem (Yang, Y., Di, 2013). The slack variables in maximizing problems represent any unused capacity in the constraint and its value can take from zero to the maximum of that constraints (Yaqoob et al., 2021).

3. RESEARCH METHOD

The purpose of this article is to find out more deeply Simplex Method for Optimization Profit in manufacturing Industries. The articles reviewed were obtained from several publisher including: Google Scholar dan ScienceDirect. This article aims to explain knowledge about the optimization profit with simplex method in the industry, consider the Simplex Method as a company strategy, and figure out how to gain more insight into the Simplex Method. The journals we reviewed come from many countries such as Malaysia, Germany, Europa, China, Indonesia, Nigeria, Italia, Brazil, India, USA, Pakistan, Bangladesh and Africa. Keywords can be used to identify paper submissions. In completing a literature review, there are several stages that must be carried out so that the implementation is systematic and focused. The goal of this paper is therefore to present a comprehensive overview of all the papers published by leading journals and specialist journals in simplex method from 2019 to 2024, to examine the most popular problems published in the field of simplex methods globally. The framework study carried out in this study is shown in Figure 1.

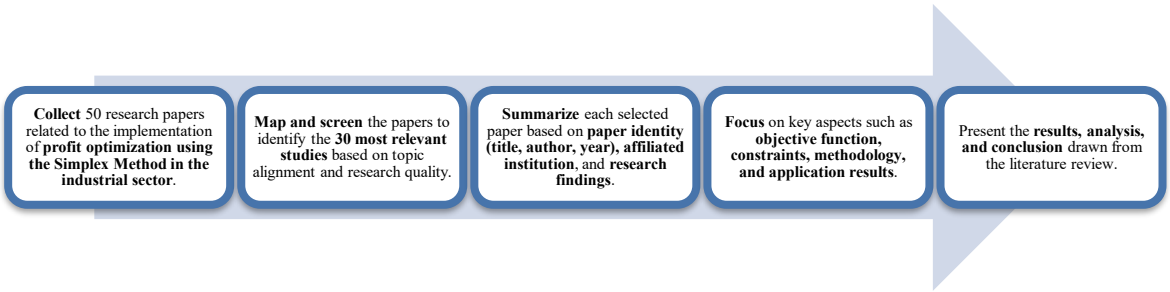

Figure 1. Study framework

4. RESULT AND DISCUSSION

4.1 Paper Summary

The paper will be evaluated. Evaluation is carried out based on year, researcher, research object, and results obtained.

Table 1. Result literature review of the simplex method

No	Paper Identity	Research	Result
1	(Azlan et al., 2019)	Optimization Technique in Managing Labour Efficiency in an Automotive Company	With the application of the optimization technique simplex methode, better labour productivity of 83.33%, Delivery team can achieve labour productivity up to 92.31%
2	(König et al., 2023)	Flexible scheduling of diagnostic tests in automotive manufacturing	Applying the Simplex method in linear programming, car can be scheduled in 97%
3	(Huri & Mankovits, 2020)	Optimization of Automotive Rubber Bumper	The chosen parameters for the optimization algorithm were successful in identifying the local search algorithm parameters.y executing 22 additional functions.
4	(Wang et al., 2022)	Early hydration and compressive strength of steam cured high-strength concrete based on simplex centroid design method	Using Simplex centroid design method,SF and FAM increased from 0 % to 15 % and 30 %,

No	Paper Identity	Research	Result
5	(Abidin et al., 2024)	Optimization of Production Results from Panciro Village Tempe Manufacturing Factory Using Simplex Method	The Panciro Village tempeh production factory generates a maximum profit of 675,000 per production through the combination of large and small tempeh quantities. To achieve this maximum profit, an additional 50 large tempeh and 25 small tempeh need to be produced
6	(Panday & Anggaina, 2023)	Profit Optimization of Maesa Cake and Bakery Shops with Linear Programming-Simplex Method	that the maximum profit that can be obtained at the Maesa Cake and Bakery Branch Legend Bakery is IDR 270,000.00 by selling 5 units of Banana Bolu and 50 units of Banana Bolen.
7	(Oladejo et al., 2019)	Optimization Principle and it is Application in Optimizing Landmark University Bakery Production Using Linear Programming	From the result of the Linear Programming model, total sales of about 14,000 loaves of x1 (family size bread) and 10,571 loaves of x3 (chocolate bread) can be sold by the LMU Bakery per month. An optimal profit of approximately N1,860,000 per month based on the costs of raw materials and the capacity of the oven.
8	(Squeo et al., 2021)	Optimization for Mixture in the Food Sector	Mixture design was also successfully applied in research involving the microbiological aspects of the food sector. This approach facilitated the identification of synergistic or antagonistic effects on phytochemical extraction. The optimal mixture was found to consist of 22.39% acetone, 37.37% ethanol, and 40.24% water
9	(Nunes Filho et al., 2021)	Effects of adding spices with antioxidants compounds in red ale style craft beer: A simplex-centroid mixture design approach	The t-test for the simple sample demonstrated an absence of significant differences among the estimated values and the triplicate experiments. For the green beers, the p-values were 79.77%, 80.76% and 73.04% for TPC, DPPH and FRAP, respectively; while for aged beers, the values were 82.45%, 88.45% and 89.73%.
10	(Andrade et al., 2021)	The integrated lot sizing and cutting stock problem in an automotive spring factory	The results showed that losses were reduced by 49.7% using the proposed solution, leading to significant savings in raw materials, approximately 3.3 tons of steel per week.
11	(Santos et al., 2021)	Evaluation of reduced-fat, reduced-salt fermented sausage incorporating microcrystalline cellulose, resistant starch, and oat fiber using the Simplex Design	This study demonstrated that MCC, RS and OF can contribute to the development of fermented sausage with simultaneous reduction of fat (25%) and reduction of salt (25% KCl; 75% NaCl).
12	(Singaravelan et al., 2021)	Application of Two-Phase Simplex Method (TPSM) for an Efficient Home Energy Management System	The results of TPSM method has less consumption cost for load LS1, LS3, and LS4 in comparison with the existing methods. On simulations, the response time of the proposed TPSM is 0.047 s, which is the lowest among all other algorithms.
13	(Gebrehiwot et al., 2019)	Optimum profit using linear programming a product-mix of textile manufacturing companies	The results from the LPP model of the case company articulate that the maximum profit attained is Birr 66,850,232.79 (Ethiopian currency) per quarter
14	(Chanda et al., 2022)	A Study on Application of Linear Programming on Product Mix for Profit Maximization and Cost Optimization	Reverse Simplex method for improving the profit by around 9.1% was observed without considering customer orders
15	(Diahovchenko & Viacheslav, 2020)	Optimal composition of alternative energy sources to minimize power losses and maximize profits in distribution power network	resulting optimal solution gives the following results: maximum profit Z = 14473.98 thousand $. At the same time, x1 = 346.931 kWh of electric energy should be generated by a solar power station, and x2 = 2134.169 kWh should be obtained from a wind farm
16	(Lozano Medina et al., 2024)	Optimization tool for demand response in island electricity systems (IES) using the Simplex method and Generalized reduced gradient (GRG)	that the maximum daily cost savings in fuels in power production plants can be estimated for the day studied of approximately €85,000,
17	(Imam Purwanto & Makmun, 2023)	Implementation System Of Simplex Method For Optimazation Profit	the total profit obtained after being converted into rupiah is Rp. 1,777,003. assuming all goods are sold and there is no increase in raw materials.
18	(Lee et al., 2020)	The Optimization of Machining Parameters for Milling Operations by Using the Nelder–Mead Simplex Method	A 30% increase in profit is observed using the Nelder–Mead Simplex method compared to the feasible direction method of Tolouei and Bidhendi

No	Paper Identity	Research	Result
19	(Kimutai et al., 2019)	Energy optimization model using linear programming for process industry	The minimum cost of product mix, when the electricity cost is Ksh 20/kWh, wood fuel cost Ksh 2.20/kg and fuel oil is Ksh 57/Litre, is Ksh 2,813,030 for the planned month. Results of the model provide optimum production mix with minimum energy cost
20	(Kalwar et al., 2022)	Optimization of product mix and maximization of profit: case of leather industry	Using of linear programming model, the model was developed by which the profit was maximized by 92%.
21	(Abubakar et al., 2021)	Simplex C++ Syntax for Solving Chemical Engineering Cost Optimization Problems	With simplex C++ Sytax, a maximum profit of N107,666,640 was generated without taking into account other products.
22	(Islam et al., 2022)	Application Of Linear Programming For Profit Maximization	Based on the results of the LP model, it is recommended that the Biscuit factory focus on the sales of Fit and Dry Cake. This strategy would yield the company an optimal profit of approximately 1257.78 taka, based on the usage of ingredients.
23	(Okeke & N, 2019)	Modelling Optimal Paint Production using Linear Programming	The result shows that 10 units of small bucket and 0 unit of big bucket should be produced which gives a maximum profit of N7000.00.
24	(Atif & Mudasir, 2023)	Optimizing Production of Chemicals Firm using Linear Programming Technique	By combining the values of all four products, the PASVEP Chemicals Production firm gets the maximum optimal profit of Rs. 15882.89
25	(Tolentino Souza et al., 2020)	Analysis of chemical admixtures combination on coating mortar using Simplex network method	The Simplex network method was efficient to visually present the effect of each admixture and their combinations and it also contributed to get better proportion of admixtures if the design limits of properties are already known as when they are specified in standards.
26	(Susanto, 2021)	Maximize Profit and Optimize Both Time and Business Capital Resources Through The Determination of Many Small, Medium and Large Packing Units In The" ENY" Tempe Chips Home Industry	To achieve a maximum profit of 3,058,600 rupiah, the company must produce 661 units of small packaging and 269 units of large packaging. This will result in an additional profit of 23,600 rupiah per production period.
27	(Vasilakakis & Giannikos, 2023)	A Robust Optimization Model for Determining Optimal Diets for Food and Beverage	results of the model, setting the daily cost per person in F&B as 4.5 monetary units to be 40% of the total daily cost (i.e., 1.8. The resulting solutions are feasible and integer. The resulting optimal solution and we have an average Daily per Person Food Cost in F&B of about 3.7 monetary units (indeed below the goal of 4.5 monetary units) and a share of lunch and dinner in the daily food costper person of about 40%.
28	(Ibrahim et al., 2020)	Optimization scheme using linear programming in a production line of rite foods limited ososa	The results showed that by using the linear programming model, the overall production cost could be optimized to three hundred and thirty-five thousand, two hundred and eighty-one naira (₦335,281.88).
29	(Da Silva et al., 2022)	Tariff optimization under incentive regulation of public services using simplex method	The resulting variable terms (x) are able to application in this hypothetical scenario, respecting the restrictions and maximizing the company's revenue to this regulatory cycle (to R$ 4.306.952.177).
30	(Abu et al., 2022)	Simplex method for profit maximization in bakery store	The result will support the bakery optimally from the expense of raw materials, and the maximum profit is about RM38200 per month.

4.2 Paper Identification

Literature will be identified from various perspectives. The perspectives focus on the industry, distribution by country, year of publication, and number of publishers. The implementation of the linear programming Simplex method is very popular in the manufacturing industry. Further discussion here will focus on the food industry. Figure 2 shows that the Simplex Method is more widely implemented in the food industry. This aligns with the growing trend in the food industry. The application of linear programming, especially using the Simplex Method, greatly assists the food industry by analyzing maximum profit outcomes and improving production quality. The

country of origin of the researchers can be seen in chart (Figure 3), where the majority of researchers are from Brazil, conducting research in manufacturing, Food, Automotive and Chemical Industry.

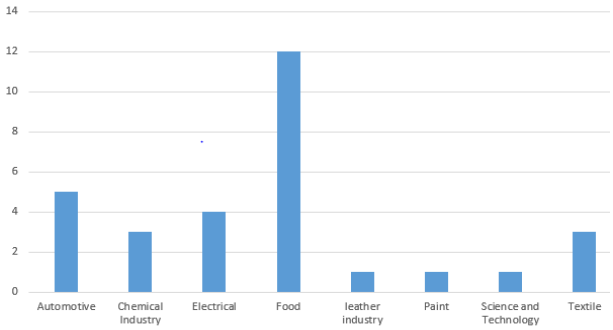

Figure 2. Identification focus on industry

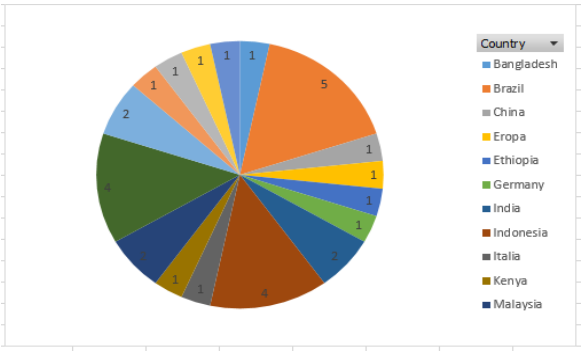

Figure 3. Focus on country

Figure 4 shows that Elsevier Publish-er was the most commonly searched during the 2019-2024 period (Figure 5). Elsevier is one of the largest academic publishers in the world. The author suggests researchers use Elsevier as a reference in collecting reference sources in research.

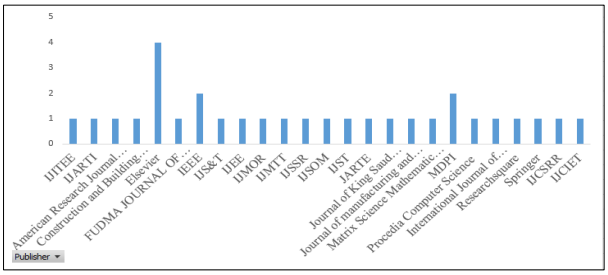

Figure 4. Focus of publisher

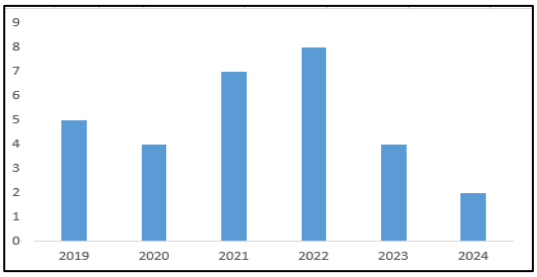

Figure 5. Year of publication

An analysis of 30 scientific articles on the application of the Simplex Method in the manufacturing sector highlights several significant advantages for businesses. The implementation of the Simplex Method acts as an innovative strategy, enabling companies to achieve substantial improvements in operational performance. Key benefits observed from its application in manufacturing industries include: efficient resource allocation, reduced operational costs, enhanced decision-making processes, increased production output, minimized risk, and greater support for data-driven decision-making. These outcomes collectively contribute to increased profitability and improved competitiveness in the market.

Given the broad range of advantages associated with the Simplex Method, it is recommended that future research continue adopting this approach to address various optimization problems and achieve measurable benefits—particularly within the context of industrial operations. The Simplex Method has been widely applied across different industrial sectors in numerous countries. Its continued popularity is evident from the steady publication of research papers over the past five years, indicating sustained scholarly interest in exploring its practical implementation.

In the context of Industry 4.0, the integration of the Linear Programming Simplex Method must evolve to align with emerging technologies. Future research should explore the enhancement of the Simplex Method through integration with: Big Data Analytics, Artificial Intelligence (AI) and Machine Learning (ML), Cyber-Physical Systems (CPS), Hybrid Optimization Models, Autonomous Decision-Making Systems, and Resilience and Risk Management Frameworks. Such integration is

expected to significantly increase the robustness, responsiveness, and efficiency of decision-making processes in smart manufacturing systems.

5. CONCLUSION

Based on a systematic analysis of 30 scientific articles published between 2019 and 2024, it can be concluded that the Simplex Method remains an effective and widely adopted approach for optimizing profits in the manufacturing industry. The application of this method has been proven to offer various benefits, including increased production efficiency, reduced operational costs, more optimal resource allocation, and improved quality of data-driven decision-making. This study also highlights the growing adoption of the Simplex Method not only in the automotive and chemical industries but also in the food, textile, and energy sectors. The predominance of contributions from countries such as Brazil, India, and Indonesia underscores the method's significance in developing countries in addressing challenges related to industrial efficiency and competitiveness. Future research is recommended to further explore the advantages of the Simplex Method in the context of Industry 4.0, particularly through its integration with emerging technologies. Additionally, investigating hybrid optimization models within small and medium-sized manufacturing enterprises (SMEs) will help demonstrate the method's flexibility and effectiveness in environments with limited resources.

REFERENCES

Abidin, Z., Ikawidjaja, N., Rizal Zaenal, F., Tenri Uleng Akal, A., Adz Zahra Annur, I. S., Alhamdi, A., Rahmelia, S., Usman, S., & Ikhwan Febrian, A. (2024). *Optimization of Production Results from Panciro Village Tempe Manufacturing Factory Using Simplex Method*. *07*(01), 34–42. www.aijbm.com

Abu, M. S., Aik, L. E., Choon, T. W., & Arbin, N. (2022). Simplex Method For Profit Maximization in Bakery Store. *International Journal of Advanced Research in Technology and Innovation*, *4*(2), 92–98. https://doi.org/10.55057/ijarti.2022.4.2.10

Abubakar, A. M., Francis, O. C., Sarkinbaka, Z. M., & Yahaya, M. S. (2021). Simplex C++ syntax for solving chemical engineering cost optimization problems. *Research Inventy: International Journal of Engineering And Science*, *11*(7), 39–47. https://doi.org/10.5281/zenodo.5146856

Andrade, P. R. de L., de Araujo, S. A., Cherri, A. C., & Lemos, F. K. (2021). The integrated lot sizing and cutting stock problem in an automotive spring factory. *Applied Mathematical Modelling*, *91*, 1023–1036. https://doi.org/10.1016/j.apm.2020.10.033

Atif, M., & Mudasir, M. (2023). *Optimizing Production of Chemicals Firm using Linear Programming Technique*. 1–17.

Azlan, N. A. A. B. N., Bin Mohamad, E., Bin Salleh, M. R., & Saptari, A. (2019). Application of Optimization Technique in Managing Labour Productivity for an Automotive Company. *International Journal of Innovative Technology and Exploring Engineering*, *9*(1), 3474–3481. https://doi.org/10.35940/ijitee.A4935.119119

Chanda, R., Pabalkar, V., & Gupta, S. (2022). A Study on Application of Linear Programming on Product Mix for Profit Maximization and Cost Optimization. *Indian Journal of Science and Technology*, *15*(22), 1067–1074. https://doi.org/10.17485/ijst/v15i22.164

Da Silva, R. F., De Araújo Costa, I. P., Dos Santos, M., Fávero, L. P. L., Santos, L. J. T., Moreira, M. Â. L., & Kojima, E. H. (2022). Tariff Optimization under Incentive Regulation of Public Services Using Simplex method. *Procedia Computer Science*, *214*(C), 1325–1333. https://doi.org/10.1016/j.procs.2022.11.312

Dantzig, G. B., & Thapa, M. N. (2003). *Linear Programming 1: Introduction*. Springer US.

Diahovchenko, I., & Viacheslav, Z. (2020). Optimal composition of alternative energy sources to minimize power losses and maximize profits in distribution power network. *2020 IEEE 7th International Conference on Energy Smart Systems, ESS 2020 - Proceedings*, *May 2020*, 247–

252. https://doi.org/10.1109/ESS50319.2020.9160259

Florez-Orrego, D., Sharma, S., & Navabi, S. (2022). Editorial: Integration And Optimization In The Chemical Process Industry. *Frontiers in Chemical Engineering*, *4*, 1–5. https://doi.org/10.3389/fceng.2022.961022

Gebrehiwot, S. A., Alemu, A. B., & Woubante, G. W. (2019). Ensure Optimum Profit Using Linear Programming A Product-Mix of Textile Manufacturing Companies. *International Journal of Mathematics in Operational Research*, *14*(3), 389. https://doi.org/10.1504/ijmor.2019.10020787

Hopp, W. J., & Spearman, M. L. (2011). *Factory Physics (3rd ed.)*. McGraw-Hill Education.

Huri, D., & Mankovits, T. (2020). Parameter selection of local search algorithm for design optimization of automotive rubber bumper. *Applied Sciences (Switzerland)*, *10*(10). https://doi.org/10.3390/app10103584

Ibrahim, E., Adewole, L. M., Loyinmi, A. I., & Sodeinde, A. C. (2020). An Optimization Scheme Using Linear Programming In A Production Line Of Rite Foods Limited Ososa. *FUDMA Journal of Sciences (FJS)*, *2507*(February), 1–9.

Imam Purwanto, & Makmun. (2023). Implementation System of Simplex Method for Optimization Profit. *International Journal Science and Technology*, *2*(2), 53–60. https://doi.org/10.56127/ijst.v2i2.822

Islam, N., Mim, A. Y., & Prodhan, M. R. (2022). Application of Linear Programming for Profit Maximization: a Case Study of a Cookies Factory in Bangladesh. *Matrix Science Mathematic*, *6*(1), 01–04. https://doi.org/10.26480/msmk.01.2022.01.04

Kalwar, M. A., Khan, M. A., Shahzad, M. F., Wadho, M. H., & Marri, H. B. (2022). Development of Linear Programming Model for Optimization of Product Mix and Maximization of Profit: Case Of Leather Industry. *Journal of Applied Research in Technology & Engineering*, *3*(1), 67–78. https://doi.org/10.4995/jarte.2022.16391

Kimutai, I., Maina, P., & Makokha, A. (2019). Energy Optimization Model Using Linear Programming for Process Industry: A Case Study of Textile Manufacturing Plant in Kenya. *International Journal of Energy Engineering*, *2019*(2), 45–52. https://doi.org/10.5923/j.ijee.20190902.03

König, S., Reihn, M., Abujamra, F. G., Novy, A., & Vogel-Heuser, B. (2023). Flexible Scheduling Of Diagnostic Tests In Automotive Manufacturing. *Flexible Services and Manufacturing Journal*, *35*(2), 320–342. https://doi.org/10.1007/s10696-021-09438-3

Lee, Y., Resiga, A., Yi, S., & Wern, C. (2020). The Optimization of Machining Parameters for Milling Operations by Using the Nelder-Mead Simplex Method. *Journal of Manufacturing and Materials Processing*, *4*(3), 1–22. https://doi.org/10.3390/jmmp4030066

Lozano Medina, J. C., Henríquez Concepción, V., Mendieta Pino, C. A., & León Zerpa, F. (2024). Proposal of An Optimization Tool For Demand Response In Island Electricity Systems (IES) Using The Simplex Method And Generalized Reduced Gradient (GRG). *Journal of King Saud University - Science*, *36*(9). https://doi.org/10.1016/j.jksus.2024.103345

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, *7*(1), 77–91.

Nunes Filho, R. C., Galvan, D., Effting, L., Terhaag, M. M., Yamashita, F., Benassi, M. de T., & Spinosa, W. A. (2021). Effects of Adding Spices With Antioxidants Compounds In Red Ale Style Craft Beer: A Simplex-Centroid Mixture Design Approach. *Food Chemistry*, *365*(January), 0–1. https://doi.org/10.1016/j.foodchem.2021.130478

Okeke, S., & N, A. (2019). Modelling Optimal Paint Production using Linear Programming. *International Journal of Mathematics Trends and Technology*, *65*(6), 47–53. https://doi.org/10.14445/22315373/ijmtt-

v65i6p508

Oladejo, N. K., Abolarinwa, A., Salawu, S. O., Lukman, A. F., & Bukari, H. I. (2019). Optimization Principle and Its' Application In Optimizing Landmark University Bakery Production Using Linear Programming. *International Journal of Civil Engineering and Technology*, *10*(2), 183–190.

Panday, R., & Anggaina, M. (2023). Profit Optimization and Production of Maesa Cake and Bakery Shops with Linear Programming-Simplex Method. *International Journal of Current Science Research and Review*, *06*(01), 499–506. https://doi.org/10.47191/ijcsrr/v6-i1-54

Santos, J. M. dos, Ignácio, E. O., Bis-Souza, C. V., & Silva-Barretto, A. C. da. (2021). Performance of reduced fat-reduced salt fermented sausage with added microcrystalline cellulose, resistant starch and oat fiber using the simplex design. *Meat Science*, *175*(January). https://doi.org/10.1016/j.meatsci.2021.108433

Setiawan, I., & Purba, H. H. (2020). A Systematic Literature Review of Key Performance Indicators (KPIs) Implementation. *Journal of Industrial Engineering and Management Research (JIEMAR)*, *1*(3), 200–208. https://www.researchgate.net/publication/345941517

Setiawan, I., Purba, H. H., & Debora, F. (2020). A Systematic Literature Review of Implementation Six Sigma in Manufacturing Industries. *Operations Excellence: Journal of Applied Industrial Engineering*, *12*(3), 319. https://doi.org/10.22441/oe.2020.v12.i3.005

Singaravelan, A., M., K., Ram, J. P., B., G., & Kim, Y. J. (2021). Application of Two-Phase Simplex Method (TPSM) for an Efficient Home Energy Management System to Reduce Peak Demand and Consumer Consumption Cost. *IEEE Access*, *9*, 63591–63601. https://doi.org/10.1109/ACCESS.2021.3072683

Squeo, G., De Angelis, D., Leardi, R., Summo, C., & Caponio, F. (2021). Background, Applications and Issues of The Experimental Designs for Mixture in The Food Sector. *Journal Foods*, *10*(5), 1–30. https://doi.org/10.3390/foods10051128

Susanto, L. (2021). Effort to Maximize Profit and Optimize Both Time and Business Capital Resources Through The Determination of Many Small, Medium and Large Packing Units in the "Eny" Tempe Chips Home Industry. *International Journal of Social Service and Research*, *1*(3), 242–250. https://doi.org/10.46799/ijssr.v1i3.40

Tolentino Souza, A., de Almeida Carvalhais, C., & dos Santos, W. J. (2020). Analysis Of Chemical Admixtures Combination On Coating Mortar Using Simplex Network Method. *Construction and Building Materials*, *239*. https://doi.org/10.1016/j.conbuildmat.2019.117796

Vasilakakis, K., & Giannikos, I. (2023). A Robust Optimization Model for Determining Optimal Diets for Food And Beverage (F&B) Items. *International Journal of Supply and Operations Management*, *10*(4), 485–500. https://doi.org/10.22034/ijsom.2023.109998.2806

Wang, P., Li, X., Huo, X., Ali, S., Sun, J., Qin, J., Liang, K., & Liu, Y. (2022). Early Hydration and Compressive Strength of Steam Cured High-Strength Concrete Based on Simplex Centroid Design Method. *Case Studies in Construction Materials*, *17*. https://doi.org/10.1016/j.cscm.2022.e01583

Yang, Y., Di, J. & Y. G. (2013). Research on goal programming algorithm based on Lingo. *Journal of Conver-Gence Information Technology*, *8*(7), 1009–1016.

Yaqoob, A. K., Junoh, A. K., Muhamad, W. Z. A. W., Ramli, M. F., Ghazali, N., & Mo'ath, A. L. L. U. W. A. I. C. I. (2021). Simplex And Interior Point Methods for Solving Budgetary Allocation Linear Programming Problem as IR4.0 Strategy. *Journal of Theoretical and Applied Information Technology*, *99*(22), 5339–5350.