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Optimization of Employee Task Assignments Using the Hungarian Method and POM-QM at Serupa Cafe

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ABSTRACT *– This study aims to optimize employee task assignments at Serupa Café, which faces issues of workload imbalance and inefficient task completion times. The research gap lies in the limited application of algorithm-based optimization methods within human resource management in the food and beverage service sector. To address this, the study applies the Hungarian Method, an algorithmic approach with a time complexity of $O(n^3)$, to determine the most efficient pairing between employees and tasks. The computation and validation processes were carried out using the POM-QM for Windows software as a quantitative analysis tool. The results indicate that the optimal assignment configuration achieved a total completion time of 85 minutes, with complete consistency between manual and software-generated results. System testing demonstrated high computational efficiency and no logical errors during data processing. Therefore, this study concludes that integrating the Hungarian Method with POM-QM significantly enhances operational performance and contributes to the application of informatics techniques for optimizing human resource management within the service industry.*

Keywords *- Employee Task Optimization; Hungarian Method; POM-QM for Windows*

Optimasi Penugasan Karyawan Menggunakan Metode Hungarian dan POM-QM di Serupa Cafe

ABSTRAK *– Penelitian ini bertujuan untuk mengoptimalkan penugasan kerja karyawan di Serupa Café yang menghadapi permasalahan ketidakseimbangan beban kerja dan waktu penyelesaian tugas yang tidak efisien. Kesenjangan penelitian terletak pada belum adanya penerapan metode optimasi berbasis algoritma dalam konteks manajemen sumber daya manusia di sektor jasa makanan dan minuman. Untuk mengatasi permasalahan tersebut, penelitian ini menerapkan Metode Hungarian sebagai pendekatan algoritmik dengan kompleksitas waktu $O(n^3)$ untuk menentukan kombinasi penugasan paling efisien antara karyawan dan jenis pekerjaan. Proses perhitungan dan validasi dilakukan menggunakan aplikasi POM-QM for Windows sebagai alat bantu analisis kuantitatif. Hasil penelitian menunjukkan bahwa konfigurasi penugasan optimal menghasilkan total waktu penyelesaian sebesar 85 menit, dengan kesesuaian penuh antara hasil manual dan hasil komputasi. Pengujian sistem menunjukkan efisiensi komputasi yang tinggi dan tidak ditemukan kesalahan logika dalam pemrosesan data. Dengan demikian, penelitian ini menyimpulkan bahwa integrasi Metode Hungarian dan POM-QM dapat meningkatkan kinerja operasional secara signifikan, serta memberikan kontribusi dalam penerapan teknik informatika untuk optimasi manajemen sumber daya manusia di industri jasa.*

Keywords *- Metode Hungarian; Optimasi Penugasan Karyawan; POM-QM for Windows*

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1. INTRODUCTION

The rapid growth of the culinary service industry requires every business to enhance operational efficiency and workforce productivity. One of the critical aspects of café management lies in assigning employees effectively so that food preparation and customer service can be carried out efficiently. Serupa Café, located on Jl. Nangka, Sorong Regency, West Papua Province, is a culinary business that offers a variety of menus, including Indonesian dishes, Japanese food, snacks, and beverages. With only four employees—Flo, Tia, Maria, and Delon—effective task allocation becomes essential to ensure time efficiency and maintain service quality for customers.

The main problem faced by Serupa Café is the suboptimal assignment of employees to various menu tasks that differ in complexity and completion time. Each employee has a distinct level of skill, experience, and work speed, which can lead to an imbalance in workload distribution and longer overall service times. Therefore, an optimization approach is required to determine the most efficient assignment of workers to tasks, aiming to minimize total completion time while maintaining service quality.

In this context, the Hungarian Method serves as an effective mathematical approach for optimizing task assignments between an equal number of resources and activities [1], [2], [3], [4]. This method provides optimal solutions in two forms—minimum solutions, which minimize total time, cost, or distance, and maximum solutions, which maximize profit or productivity [5], [6], [7], [8], [9]. According to Kurnia and Suseno (2021), the Hungarian Method can be utilized to allocate resources to tasks efficiently, reducing production costs and operational time while enhancing overall system effectiveness [10], [11], [12], [13], [14], [15]. Applying this method in Serupa Café is expected to yield a more efficient distribution of workload, thereby minimizing the total time required to complete each task.

To implement such a quantitative optimization method, computational tools are required to handle complex calculations accurately and efficiently. One widely used application for this purpose is POM-QM for Windows, a software designed to assist in decision-making processes within production and operations management [16], [17], [18], [19], [20], [21]. The software provides various analytical modules, including the assignment model, which directly supports the implementation of the Hungarian Method. According to Muhamad et al. (2022), POM-QM plays a crucial role in helping managers and researchers perform systematic, accurate, and rapid calculations when solving optimization problems in management [3], [10], [22], [23].

The research gap identified in this study lies in the limited application of the Hungarian Method within the food and beverage service industry, particularly among small-scale businesses such as local cafés in developing regions [24], [25], [26], [27], [28], [29]. Most previous studies have focused on manufacturing, logistics, or large-scale workforce planning, while relatively few have examined its implementation in service-oriented contexts [8], [30], [31], [32], [33], [34], [35]. In fact, applying the Hungarian Method to a café setting like Serupa Café can provide tangible benefits in improving operational efficiency, especially in time-based task assignment. Therefore, this study seeks to fill this gap by applying the Hungarian Method through the POM-QM for Windows application to optimize employee working time in a local culinary business environment [4], [36], [37], [38].

Based on the foregoing discussion, this research focuses on the application of the Hungarian Method to optimize employee working time at Serupa Café using POM-QM for Windows as an analytical tool. The results of this study are expected to provide a deeper understanding of how optimization techniques can be applied in café operations and to serve as a foundation for developing effective human resource management strategies. Consequently, this research contributes not only theoretically to the field of operations management but also practically by offering insights for café owners to manage employee performance and productivity more efficiently.

2. LITERATURE REVIEW

The Hungarian Method is one of the most widely used mathematical algorithms for solving assignment problems, namely the allocation of resources to a set of tasks with the objective of achieving an optimal outcome. According to Kurnia and Suseno (2021), this method was developed by Harold Kuhn in 1955 as an enhancement of concepts introduced earlier by D. König and J. Egerváry. The fundamental principle of the Hungarian Method is to identify the optimal combination of assignments between workers and tasks that yields the minimum or maximum total value based on a cost or time matrix [1], [11], [13], [15]. Thus, the method is not only computationally efficient but also provides an

exact optimal solution that can be applied in various fields, such as production management, transportation, and human resource allocation.

In the field of operations management, the Hungarian Method has proven to be highly effective in optimizing task distribution, minimizing production time, and enhancing organizational efficiency. Several studies have demonstrated that this method produces more objective and measurable decisions compared to manual or intuition-based approaches. For instance, research conducted by Sari and Wahyuni (2020) revealed that applying the Hungarian Method to workforce assignments in a production environment reduced total completion time by up to 15% [3], [9], [39]. Therefore, the application of this method is particularly relevant for small and medium-sized enterprises, such as cafés, which often operate with a limited number of employees and multiple job types with varying levels of difficulty [3], [10], [21], [40]. In the case of Serupa Café, this method can assist in determining the most efficient employee-task assignments to minimize total working time.

To support the practical implementation of the Hungarian Method, computational tools capable of performing rapid and accurate calculations are essential. One of the most commonly used applications in both research and managerial practice is POM-QM for Windows, a software designed specifically to assist in quantitative decision-making in production and operations management. According to Muhamad et al. (2022), this application provides a user-friendly interface and various analytical modules—including the assignment model—that simplify the application of the Hungarian Method without requiring complex manual computation [10], [41], [42], [43]. Moreover, POM-QM can display results in clear tabular and graphical formats, thereby facilitating the interpretation of data and improving the speed and accuracy of managerial decision-making.

Previous literature also indicates that the integration of the Hungarian Method and POM-QM for Windows has not been widely applied in the food and beverage service industry, particularly among small-scale businesses in developing regions. Most prior studies have focused on manufacturing and transportation sectors, where optimization problems are easier to quantify. Therefore, research that applies the Hungarian Method supported by POM-QM software in the context of workforce management in cafés—such as Serupa Café—offers both theoretical and practical contributions. Theoretically, it expands the scope of Hungarian Method applications within service-oriented operational management. Practically, it provides a concrete solution for optimizing employee working time, improving service efficiency, and strengthening business competitiveness in the increasingly dynamic culinary industry.

3. RESEARCH METHOD

The research flow can be seen in Figure 1 and the description is as follows:

1) Type and Approach of Research
   This study employs a quantitative approach with a descriptive-analytical research design. The quantitative approach is chosen because the research focuses on processing numerical data in the form of completion times for each employee in preparing different menu items at Serupa Café. The primary goal is to identify the optimal assignment combination between employees and tasks that results in the minimum total working time. The analysis is conducted using the Hungarian Method, implemented through the POM-QM for Windows application as a computational tool to facilitate accurate and efficient calculations.
2) Research Location and Object
   The research was conducted at Serupa Café, located on Jl. Nangka, Sorong Regency, West Papua Province. The object of this research is the work assignment system among the four employees—Flo, Tia, Maria, and Delon—who are responsible for preparing various menu items requiring different processing times. The primary data used in this study consist of the time required by each employee to complete each menu item, organized into a cost or time matrix as the basis for analysis using the Hungarian Method.
3) Data Sources and Collection Techniques
   The data used in this study consist of:
   Primary data, obtained through direct observation of employee work activities at Serupa Café and the measurement of time required for each employee to complete each type of menu item.
   Secondary data, gathered from café documentation and relevant literature on the Hungarian Method, work assignment optimization, and the use of POM-QM for Windows.
   Data collection techniques include field observation, interviews, and document review to ensure the accuracy and validity of the data used in the analysis process.
4) Analytical Procedures Using the Hungarian Method
   The Hungarian Method is applied to determine the optimal combination between employees and tasks with the objective of minimizing total working time. The procedure follows a

systematic sequence of steps as described by Kurnia and Suseno (2021) [10], [11], [12], [13], [15]:

a. Constructing the Cost or Time Matrix
The working time of each employee for each task is organized into a square matrix (n × n), where rows represent employees and columns represent menu items or tasks.

b. Row Reduction
For each row, the smallest element in that row is subtracted from every element in the same row to ensure that each row contains at least one zero element.

$$a'_{ij} = a_{ij} - \min(a_{i1}, a_{i2}, ..., a_{in})$$

c. Column Reduction
After row reduction, the same operation is performed on each column: subtract the smallest value in each column from all elements in that column.

$$a''_{ij} = a'_{ij} - \min(a'_{1j}, a'_{2j}, ..., a'_{nj})$$

d. Initial Assignment
Once the reduced matrix is obtained, assignments are made at the zero-valued positions, following the rule that each row and column can only have one assignment.

e. Optimality Test
If the number of assignments equals the number of employees (or tasks), the solution is optimal. If not, further adjustments are needed.

f. Matrix Adjustment
   a) Mark all rows that have no assigned zeros.
   b) Mark columns that contain zeros in the marked rows.
   c) Draw lines through the marked rows and columns, and find the smallest uncovered element (k).
   d) Subtract k from all uncovered elements and add k to all elements covered twice by lines.
   e) Repeat the process until the number of assignments equals n, indicating that the optimal solution has been reached.

g. Determining the Optimal Solution
Once the adjustment steps are complete and all tasks have been assigned, calculate the total time corresponding to the chosen combination. The smallest total value represents the minimum working time—the optimal solution for the employee-task assignment at Serupa Café.

5) Implementation Using POM-QM for Windows
The Hungarian Method in this study is implemented through the POM-QM for Windows software using the Assignment Model module. The implementation steps are as follows:
   a. Open the "Assignment" module in POM-QM.
   b. Input the working time data for each employee and each menu item into the cost matrix.
   c. Select the optimization type as a minimization problem.
   d. Execute the computation process to obtain the optimal task assignments automatically.
   e. Analyze the generated results, including the optimal assignment table, minimum total time, and graphical summaries.

By using POM-QM for Windows, the calculation process becomes faster, more accurate, and less prone to human error. The analytical results serve as a decision-making tool for the café management to establish an efficient, data-driven work distribution strategy.

6) Expected Outcomes
Through the application of the Hungarian Method supported by POM-QM for Windows, this research is expected to produce an optimal assignment system in which each employee is allocated to the task most suitable to their efficiency, resulting in the minimum total working time. Furthermore, the findings are anticipated to contribute practically by enhancing productivity and service quality at Serupa Café, while also providing theoretical insights into the application of optimization methods within the food and beverage service industry.

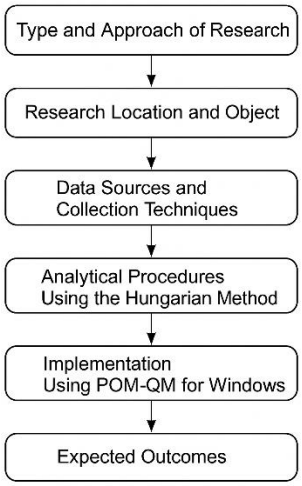

Figure 1. Research Flowchart

4. RESULTS AND DISCUSSION

The primary issue faced by Serupa Café lies in the suboptimal assignment system for employee tasks related to the preparation of various menu items, each with different levels of complexity and processing time. Each employee possesses varying degrees of skill, work experience, and speed in completing assigned duties. This condition potentially leads to an imbalance in workload distribution among employees and an increase in overall order completion time.

The results of direct observation are presented in Table 1, which illustrates the assignment of employees to specific work tasks. The café employs four workers—Flo, Tia, Maria, and Delon—each with distinct capabilities in performing different types of work. Meanwhile, the tasks at Serupa Café consist of preparing Nusantara Cuisine, Japanese Cuisine, Snacks, and Beverages. These observations provide the initial data matrix required for the application of the Hungarian Method, which aims to determine the most efficient task assignments among employees.

By analyzing this assignment matrix through the POM-QM for Windows software, this study seeks to identify the optimal combination of employee-task allocations that minimizes total completion time while enhancing overall operational efficiency at Serupa Café. The integration of the Hungarian Method with POM-QM provides a systematic and quantitative approach to decision-making, enabling the café management to allocate human resources more effectively and improve productivity in the increasingly competitive food and beverage industry.

Table 1. Employee Assignment Observation Results

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	30	45	25	25
Tia	45	30	20	15
Maria	45	50	15	15
Delon	35	40	20	10

Based on Table 1, the systematic procedures employed to achieve the optimal solution are described as follows. These steps are structured according to the Hungarian Method, which serves as the foundation for determining the most efficient task assignments among employees. The application of this method through POM-QM for Windows enables a precise and quantitative analysis of the assignment matrix, facilitating the identification of the optimal allocation that minimizes total working time and enhances overall operational efficiency at Serupa Café.

Step 1. Formulating the Cost Matrix

The initial stage involves the construction of a cost matrix representing the estimated time (in minutes) required by each employee to complete each specific task. In this study, the cost matrix is developed based on the observed order completion times of the four employees—Flo, Tia, Maria, and Delon—across four different types of tasks: Nusantara Cuisine, Japanese Cuisine, Snacks, and Beverages. The primary objective is to minimize the total completion time across all tasks. This matrix serves as the foundational input for applying the Hungarian Method through the POM-QM for Windows software, which systematically analyzes the data to determine the most efficient assignment configuration that optimizes employee performance and operational efficiency at Serupa Café.

Step 2. Row Reduction (Table 2)

In this stage, each row of the cost matrix is systematically analyzed, and the smallest value within each row is subtracted from all other elements in that row. This normalization process ensures that every row contains at least one zero element, thereby facilitating the identification of potential optimal assignments. Through this procedure, the Hungarian Method, as implemented in POM-QM for Windows, simplifies the computational process and enhances the accuracy of determining the most efficient allocation of tasks among employees at Serupa Café.

Table 2. Row Reduction Results

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	(30-25)=5	(45-25)=20	(25-25)=0	(25-25)=0
Tia	(45-15)=30	(30-15)=15	(20-15)=5	(15-15)=0
Maria	(45-15)=30	(50-15)=35	(15-15)=0	(15-15)=0
Delon	(35-10)=25	(40-10)=30	(20-10)=10	(10-10)=0

Step 3. Column Reduction (Table 3)

After completing the row reduction process, the same procedure is applied to each column of the cost matrix. The smallest value in each column is subtracted from all other elements within that column, ensuring that every column contains at least one zero element. This step further refines the matrix, creating a balanced structure that facilitates the identification of feasible assignments. Within the framework of the Hungarian Method implemented through POM-QM for Windows, this stage is essential for optimizing the computation process and establishing a solid foundation for determining the most efficient employee-task allocation at Serupa Café.

Table 3. Column Reduction Results

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	5	20	0	0
Tia	30	15	5	0
Maria	30	35	0	0
Delon	25	30	10	0

Table 4 presents the results of the subtraction process applied to the Indonesian Food column, illustrating the adjusted values obtained after column reduction.

Table 4. Results of the Subtraction Value from the Indonesian Food Column

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	(5-5)=0	20	0	0
Tia	(30-5)=25	15	5	0
Maria	(30-5)=25	35	0	0
Delon	(25-5)=20	30	10	0

Similarly, Table 5 displays the subtraction results for the Japanese Food column, showing the updated matrix values following the same procedure. These tables represent the outcomes of the column reduction stage within the Hungarian Method, as executed using POM-QM for Windows, which systematically refines the cost matrix to facilitate the identification of optimal task assignments and improve computational efficiency in determining the most effective employee allocation at Serupa Café.

Table 5. Subtraction Value Results from Japanese Food Column

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	(5-5)=0	20	0	0
Tia	(30-5)=25	15	5	0
Maria	(30-5)=25	35	0	0
Delon	(25-5)=20	30	10	0

Table 6 presents the results of the minimum value identification for each column within the cost matrix. This table highlights the smallest values obtained from each column after the reduction process, serving as a crucial reference point in the optimization procedure. The identification of these minimum values is an essential step in the Hungarian Method, as implemented through POM-QM for Windows, to ensure an accurate and systematic determination of the most efficient task assignments among employees at Serupa Café, thereby supporting the goal of minimizing total completion time and enhancing overall operational performance.

Table 6. Column Reduction Results

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	0	5	0	0
Tia	25	0	5	0
Maria	25	20	0	0
Delon	20	15	10	0

Step 4. Assignment of Zero Elements (Tabel 7)

A preliminary assignment is conducted by selecting zero elements within the cost matrix in such a way that no two selected zeros occupy the same row or column. This step produces an initial feasible solution, which serves as the basis for evaluating task allocations. If the number of assigned zeros corresponds to the total number of employees or tasks, the optimal assignment configuration has been achieved. Within the framework of the Hungarian Method implemented through POM-QM for Windows, this stage is essential for validating the efficiency of the allocation process and ensuring that the solution accurately reflects the minimum total completion time for task distribution at Serupa Café.

Table 7. Assignment of Zero Elements Results

Job / Employee	Processing Time (Minute)			
	Indonesian Food	Japanese Food	Snacks	Drinks
Flo	~~0~~	~~5~~	~~0~~	~~0~~
Tia	~~25~~	~~0~~	~~5~~	~~0~~
Maria	~~25~~	~~20~~	~~0~~	~~0~~
Delon	20	15	10	0

Step 5. Optimization Check and Matrix Adjustment

If the number of feasible assignments is fewer than the total number of employees or tasks, additional adjustment procedures must be performed. In this step, the smallest uncovered value within the matrix is identified and subtracted from all uncovered elements, while simultaneously being added to the elements located at the intersections of the covered rows and columns. This adjustment generates new zero elements, thereby enhancing the feasibility of the assignment configuration. However, in the context of this study, Step 5 was not required, as a satisfactory and feasible solution had already been obtained during Step 4 of the Hungarian Method execution using POM-QM for Windows, effectively yielding the optimal task allocation for Serupa Café.

Step 6. Final Assignment and Optimal Solution

After the necessary adjustments, the newly formed matrix is re-evaluated until a complete set of assignments can be established. The final matrix produces the optimal assignment configuration, minimizing the total completion time. By applying the Hungarian Method through POM-QM for

Windows, the study determines the most efficient combination of employee-task allocations for Serupa Café. This approach enables a balanced distribution of workloads, reduces the overall task completion duration, and enhances the café's operational performance, thereby contributing to a more effective and data-driven human resource management strategy.

Table 8. Final Assignment and Optimal Solution

Employee	Job	Processing Time (Minute)
Flo	Indonesian Food	30
Tia	Japanese Food	30
Maria	Snacks	15
Delon	Drinks	10
	Total	**85**

The data analysis conducted using the Hungarian Method through the POM-QM for Windows software produced an optimal configuration for task assignment among the employees at Serupa Café. The method systematically processed the cost matrix derived from the observed task completion times of four employees—Flo, Tia, Maria, and Delon—across four distinct task categories: Indonesian food, Japanese food, snacks, and drinks. Through the application of the Hungarian algorithm, the most efficient pairing between employees and tasks was established, ensuring a balanced workload and minimized total completion time.

Based on the computational results, the optimal task assignments were as follows: Flo was assigned to prepare Indonesian food with a completion time of 30 minutes, Tia was assigned to prepare Japanese food with a duration of 30 minutes, Maria was assigned to handle snack preparation with a total of 15 minutes, and Delon was tasked with preparing drinks, requiring only 10 minutes. These allocations represent the configuration that minimizes total processing time while considering each employee's skill level and task suitability.

The total completion time for all tasks amounted to 85 minutes, which reflects the minimum possible duration achievable under the given constraints (see Tabel 8). This result demonstrates the effectiveness of the Hungarian Method in optimizing task distribution, as it enables the identification of the most efficient employee-task combination without unnecessary overlaps or inefficiencies. The algorithm ensures that each employee is assigned precisely one task, maintaining the balance between workload distribution and operational productivity.

Overall, the implementation of the Hungarian Method through POM-QM for Windows proved successful in enhancing operational efficiency at Serupa Café. The method not only minimized total task completion time but also supported better decision-making in human resource allocation. These findings affirm that quantitative optimization models, such as the Hungarian Method, can be effectively applied within service-oriented industries to improve productivity, streamline workflow, and sustain high-quality service delivery.

The following outlines the integration procedures implemented through the POM-QM for Windows software:

Step 1. To begin the analysis, the POM-QM for Windows software is launched, and the Module Tree Assignment option is selected. Subsequently, a dialog box labeled Create Data Set for Assignment appears. In this form, the title "Serupa Café" is entered, with the Number of Jobs and Number of Machines each set to 4, corresponding to the number of employees and task categories. For the Objective parameter, the Minimize option is chosen to ensure the reduction of total completion time. Once the configuration is completed, the OK button is clicked to proceed to the next stage of the process. This initial setup, as illustrated in Figure 2, establishes the foundational parameters for applying the Hungarian Method in optimizing task allocation through the POM-QM for Windows environment.

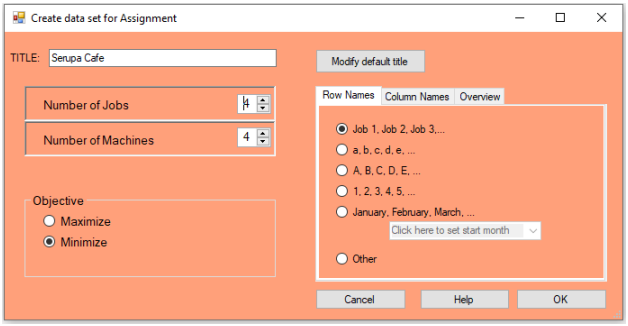

Figure 2. Form Create data set for Assignment

Step 2. The next step involves entering the data values derived from Table 1 into the corresponding input fields within the POM-QM for Windows application. This stage ensures that the cost matrix accurately reflects the task completion times for each employee across the different job categories. The resulting data entry interface, along with the configured parameters, is displayed in Figure 3, illustrating the structured setup used for implementing the Hungarian Method in the optimization process. This configuration serves as the analytical basis for determining the most efficient task allocation at Serupa Café.

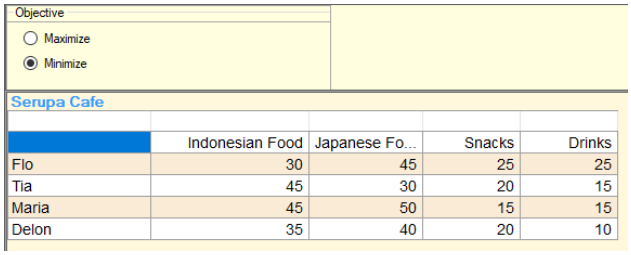

Figure 3. Data entry and configuration interface

Step 3. After completing the data input process, the Solve button is selected to initiate the optimization procedure within the POM-QM for Windows software. This action triggers the computational execution of the Hungarian Method, resulting in the generation of the optimal task assignment configuration. The output of this process, which presents the most efficient allocation of employees to tasks, is illustrated in Figure 4. This step marks the culmination of the analytical phase, where the software systematically determines the assignment pattern that minimizes total completion time and enhances operational efficiency at Serupa Café.

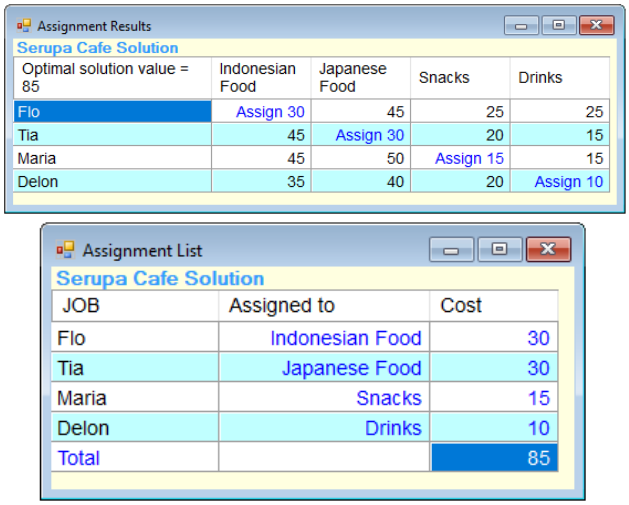

Figure 4. Assignment result interface

The results of the analysis demonstrate that the calculations obtained through the Hungarian Method are consistent with those produced by the POM-QM for Windows software, indicating complete alignment without any computational discrepancies. This consistency validates the accuracy and reliability of both the manual and software-assisted approaches, confirming that the Hungarian Method functions effectively in optimizing task assignments. The findings further emphasize that the algorithm successfully minimized the total completion time while ensuring a balanced distribution of workload among the employees at Serupa Café.

The identical results obtained from both methods affirm that the Hungarian Method is a robust and systematic approach for solving assignment problems within operational settings. Its application enabled the identification of the most efficient task allocation, thereby addressing the key challenges faced by Serupa Café—namely, unequal workload distribution and extended task completion times. By implementing this optimization process, the café achieved a measurable improvement in operational efficiency and overall productivity.

Moreover, the use of POM-QM for Windows as a computational tool significantly enhanced the analytical process by providing a structured, user-friendly interface for data input, processing, and output visualization. The software not only simplified complex calculations but also ensured precision in determining the optimal solution. This demonstrates its effectiveness as a reliable decision-support tool for managerial and operational problem-solving in real-world business environments.

In conclusion, the integration of the Hungarian Method with the POM-QM for Windows software proved to be a successful strategy for optimizing employee-task assignments at Serupa Café. The method's ability to deliver consistent and accurate results highlights its practical relevance in resource allocation and operational optimization. Consequently, this study provides empirical evidence that the combination of mathematical optimization techniques and decision-support software can serve as a powerful framework for enhancing performance and efficiency in the service industry.

5. CONCLUSION

In conclusion, the application of the Hungarian Method in conjunction with the POM-QM for Windows software successfully optimized employee-task assignments at Serupa Café, achieving a minimum total completion time of 85 minutes and ensuring an equitable distribution of workload among employees. The alignment between manual calculations and software-generated results confirms the accuracy and reliability of the Hungarian Method as an effective tool for solving assignment problems in operational management. Furthermore, the use of POM-QM for Windows provided an efficient computational platform that enhanced analytical precision and decision-making capability. This study demonstrates that integrating quantitative optimization techniques with decision-support software can significantly improve productivity and service quality in the food and beverage industry. For future research, it is recommended to expand the model by incorporating additional variables such as employee skill levels, task complexity, and dynamic scheduling scenarios to further enhance the

robustness and applicability of the optimization process in more complex operational environments.

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