APPLICATION OF HUNGARIAN ALGORITHM FOR ASSIGNING WORKERS IN A GARMENT COMPANY

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1.   Introduction

Textiles and garment sector is one of Malaysia's most important industries, contributing significantly to its GDP through exports earnings. To become a piece of clothing, it must go through four stages: designing, fabric cutting, sewing, and packaging. The sewing line consists of a set of workstations where each worker at the station performs one to several operations. In this study, we modelled the workers-jobs allocation for a garment manufacturing company that engaged in the production of school uniforms as an assignment problem.

There is a limited number of studies that demonstrate the relevance of the assignment model in the garment industry. According to Wulan et al. (2019), there are four methods that can be used to solve the assignment problems, which are Transportation method, Simplex method, Enumeration method and Hungarian method. However, they claimed that the Hungarian method is the best method in obtaining the optimal solution. Therefore, this study demonstrated the usefulness of the assignment model in workers' assignment to tasks in the garment company, and the focus was to minimize the time taken of garment production through workers assignment using the Hungarian Algorithm.

Currently, the workers are not specifically assigned to the task based on their skills and capabilities, which results in a waste of cost, time, and low production. Hence, in this study, the Hungarian Algorithm was used to reduce the time taken to complete the tasks. The result computed by this method was then validated using Vogel's Approximation Method (VAM).

2.   Methodology

This study involved eight employees and six tasks that correspond to the type of garment. The workers-jobs allocation in a garment manufacturing company that engaged in the production of school uniforms is model as an assignment problem. The researchers

addressed the time taken to do the jobs and how each person may be assigned to the right job to find the optimal allocation. The optimal allocation will result in minimizing the overall time taken to complete the production of school uniforms.

3.   Results and Discussions

The result of the assignment worker and the time spent in the production of garments for each worker after the minimization using Hungarian Algorithm is shown in Table 1.

Table 1: Result of assignment worker to job using Hungarian Algorithm

Worker	Job	School Uniforms	Time Spent (in minutes)
2	E	*Kain Baju Kurung*	25
4	D	*Baju Kurung*	25
5	B	*Kemeja Lengan Panjang*	15
6	C	*Jubah*	25
7	F	*Baju Melayu*	15
8	A	*Kemeja Lengan Pendek*	8
		Total	113 minutes

The result shows that the total time spent in the production of garments after applying the Hungarian Algorithm is 113 minutes. A total of six workers were assigned to the six types of school uniforms, while the other two workers were not assigned to any job. These show that only six workers are needed for this job that will optimize the production.

To validate the result obtained using Hungarian Algorithm, VAM was applied to the same data. We can conclude that the result was validated since the amount of time spent after applying both methods is equal, that is 113 minutes.

Table 2: Comparison results obtained from Hungarian Algorithm and VAM

Method	Time spent (minutes)
Hungarian Algorithm	113
Vogel's Approximation Method (VAM)	113

4.   Conclusion

Based on the discussion results, conclusions can be drawn as follows: HRA Enterprise productions was estimated to achieve 1,525 school uniforms per month. However, after the Hungarian method was applied, the production increased by 9.84% or 1,675 garments per month. According to the result, the best six workers were assigned to the six tasks which are: Worker *2* was assigned to *Kain Baju Kurung*, Worker *4* was assigned to *Baju Kurung*, Worker *5* was assigned to *Kemeja Lengan Panjang*, Worker *6* was assigned to *Jubah*, Worker *7* was

assigned to *Baju Melayu* and Worker *8* was assigned to *Kemeja Lengan Pendek*, with total time taken to complete the process is 113 minutes. On the other hand, Worker *1* and Worker *3* were not assigned to any task. The result of the Hungarian Algorithm was validated by using Vogel's Approximation Method.

5.   References

Wulan, E. R., Devi, A. R., & Nuraiman, D. (2019). The comparative analysis of Hungarian assessment, matrix ones assignment and alternate mansi method in solving assignment problem. *Journal of Physics: Conference Series*, *1402*(7), 1-5. https://doi.org/10.1088/1742-6596/1402/7/077090