Assignment Optimization of Courier Services Using Hungarian Method: Case Study

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ARTICLE INFO	ABSTRACT
Published Online: 16 August 2022 **Corresponding Author:** Rorim Panday	The Covid-19 pandemic has made the online shopping system become more increased. This has an impact on increasing expedition service activities to be able to serve in the shipping process. One of them is CV. Anteraja Margahayu branch which has 22 couriers to deliver packages to 11 delivery points. Problems that are often occur are related to the allocation of couriers for delivery that must be finished. This study aims to optimize courier assignments. The method used in this research is descriptive exploratory research method with a quantitative approach. The population in this study were 22 couriers, the sampling technique used in this study was a saturated sampling technique. The method of data analysis in this study used the Hungarian method. Based on the results of the study, the Hungarian method can be used to optimize the assignment of couriers to CV. Anteraja Margahayu branch. This is evidenced by the reduction in time by 290 minutes and the addition of 128 packages in organic courier assignments. Likewise for partner couriers, there was a reduction in time of 974 minutes and an increase in the number of packages by 83 packages.

INTRODUCTION

Worker allocation is the arrangement of tasks (activities) carried out by individuals (objects), so as to minimize costs. In general, the skill level, work experience, educational background, and training level of each worker are different, so the time to complete the work is different. Therefore, it is necessary to allocate workers so that the work can be completed properly, so that a company or organization can obtain optimal benefits. Each worker can do all types of work but with different weights (time, wages, etc.).(Danitai and Cintya 2017) Assignment procedures are one of the modules of operations research. Operations research is an interdisciplinary branch of applied mathematics and formal science that uses models such as mathematical models, statistics, and algorithms—to obtain a maximum or near maximum value on a problem in an environment.

The Covid-19 pandemic has forced the government to implement a Lock Down policy, where people are required to work and study from home in order to break the chain of the spread of the Covid-19 virus. Lockdown communities are supported by the growing technological era in Indonesia, making the online shopping system increasing. This has an impact on increasing expedition services to be able to contribute to the shipping process. In this expedition service too, of course there are courier services as intermediaries so

that the goods sold by producers can reach the hands of consumers even though the distance is quite far.

CV. Anteraja is one of the expedition service startups that was founded on March 27, 2019 under PT. Tri Adi Bersama. CV. Anteraja is engaged in logistics covering all markets, including MSMEs. In accordance with the increase in the online buying and selling business, Anteraja with the vision of "Being a technology-based shipping service provider that continues to grow to create shared values, through active collaboration with all stakeholders, communities and society" is able to become one of the shipping service solutions for online buying and selling actors, both sellers and buyers with various services and affordable shipping costs.

In Bekasi, CV. Anteraja opened several branches. One of the branches that will be the object of this research is the Margahayu branch which is located at Jl. HM. Joyomartono RT001/RW021 Margahayu Village, East Bekasi District, Bekasi City, West Java. CV. Anteraja Margahayu branch has 22 couriers tasked with delivering packages to 11 delivery points in the villages of Margahayu, throughout Jaya and Setia Mekar.In CV. Anteraja, another name for courier, is SATRIA, which means Swift, Safe, Reliable, Friendly, Integrity, Trustworthy. The number of couriers is divided into 3 parts, namely pick up couriers,

organic couriers, and partner couriers. organic couriers and partner couriers are the delivery department, namely couriers who send packages to the destination address, the number of delivery couriers is 22 couriers of which 11 are organic couriers and 11 are partner couriers where all of these couriers have each rotated delivery to 11 delivery points. The operational hours of pick up couriers are from 10:00 - 20:00, while organic couriers and partner couriers are from 08:00 - 20:00.

Problems that are often experienced by CV. Anteraja Margahayu branch deals with the allocation of couriers with deliveries that must be completed, especially regarding the delivery time of goods related to the working hours of the couriers. There are many cases where the couriers come home late from working hours because the number of packages and the courier assignments have not been optimal. One example is when there is an event at the online shop, often couriers send packages that exceed their operating hours. The current courier allocation is that each delivery point is sent by 2 couriers which include partner couriers and organic couriers. One solution to overcome the ineffectiveness of task placement and time optimization is to use the Hungarian method of assignment.

LITERATURE REVIEW
Operational Research
The term operations research is often associated exclusively with the use of mathematical techniques to model and analyze decision problems. (Danitai and Cintya 2017) in his research stated that the assignment procedure is one of the modules of operations research. Operations research itself is an interdisciplinary branch of applied mathematics and formal science that uses mathematical models, statistics, and algorithms to obtain maximum or near maximum scores on a problem. Operations Research is a method to formulate everyday cases whether related to business, economics, social or other fields into mathematical modeling to obtain optimal solutions. The most important part of operations research is how to translate everyday cases into mathematical models (Prasetyo and Lubis 2020).

Linear Program
A linear program is a mathematical model of the problem at hand and the use of a programmable process or procedure called an algorithm to find a solution. In the research of (Darman 2020), Linear programming is an analytical method that gives operations research success by solving various existing cases and making the best decisions. Linear programming is a general model that can be used to solve problems that optimally allocate limited resources. The mathematical model of linear programming is divided into two, namely the objective function is a function that describes the objectives in linear programming problems related to optimal resource management to maximize profits or minimize costs. The constraint function is the available

capacity limit that will be optimally allocated to various activities mathematically.

Assignment
The assignment problem is a problem that has one optimization goal, namely optimizing or minimizing existing resources to complete the task. The assignment problem is a problem regarding setting a person (object) to perform a task (activity), so that the total cost incurred in solving the assignment problem can be minimized. (Bariasti and Lestari 2017) states that the assignment problem is a matter of setting someone to do a task, so that the costs and time used to complete the task can be minimized. Assignment problems aim to optimize task completion by assigning each task to the right worker (Rahmawati et al. 2015). The assignment problem is a problem in linear programming that allocates resources to activities where there is one source and one activity (one to one basic). So each resource (employee, machine) is assigned to an activity (job, position or event).

Hungarian Methode
The Hungarian method is one of the assignment procedures that can be used to dismantle the problem of labor assignment by implementing arrangements in such a way that a maximum assignment can be obtained which in conclusion is expected to reduce the cost burden. While according (Firmansyah et al. 2020) the Hungarian method is a method for modifying rows and columns in the effectiveness matrix so that a single zero component appears in each row or column, and can be selected as the optimal assignment allocation and will give the minimum assignment result when applied to the initial matrix. This Hungarian method aims to find the optimal solution. The Hungarian method is a special form of transportation problem that optimizes the division of several tasks into a number of work centers or resources for one task only. The Hungarian method assignment problem can solve minimization (time, cost, etc.) or maximization (profit, production, etc.) problems. In general, the steps for solving assignment problems according to (Sari, Paendong, and Langi 2021) is as follows :

1. Identify and modify problems in the form of an assignment table into an effectiveness matrix. Where this matrix is made as a means to simplify the process of completing each step in the Hungarian method. If the number of rows and columns is not the same, then a dummy is required.

2. For the minimization case, take the minimum value for each row, then subtract all the values in the same row from the minimum value. As for the max case, find the maximum value in each row, and then subtract the maximum value from all the values in that row.

3. Make sure that all rows and columns have zero values. If there is still a column with a non-zero value, find the minimum value in that column and use it to subtract all the values in that column. Thus,

it can be determined that there is at least one element in each row and each column of the matrix that has a value of zero and there are no elements with negative values..

4. Establishing the optimum assignment is to draw several horizontal or vertical lines that pass through all cells with a value of 0. If the number of lines is equal to the number of rows/columns, it can be said that the assignment is optimal. If not, then it must be revised or repaired.

5. Carry out table repairs by sorting out the smallest value that is not crossed by a line and then subtracting it from all values that are not crossed by a line. After that it is added to the numbers in the line cross.

6. The assignment is placed in a cell with a value of 0. Where each number 0 is exchanged for the number 1, but each column and row only has one number 1 as an assignment.

7. Calculate the total value of the solution obtained from the elements of the initial matrix that have not been reduced in value so that the total optimum value is obtained.

Courier services

Courier services are services that provide delivery, pick-up and delivery of goods according to their destination. Courier service or logistics is the art and science of bringing goods, energy, information, and other resources (such as products, services, and production resources) to the market with the aim of optimizing the use of capital. Basically a courier is a person (individual) or who delivers messages, packages, and letters to a place according to his delivery address. The courier's job is to deliver a package or message to a place that matches the delivery address. In addition, the courier is also tasked with ensuring that packages sent in good condition arrive at their destination addresses. Therefore, the courier must comply with the Standard Operating Procedure of the shipping expedition.

RESEARCH METHOD

This research uses descriptive exploratory research method with a quantitative approach. (Utama 2018) stated that the descriptive exploratory research method is a type of research that is usually used to figure and describe a phenomenon or object that exists by tracing the cause and effect of the phenomenon. Descriptive quantitative research is research that only describes, explains, various conditions, situations, phenomena, or various research variables according to events as they are obtained, photographed, interviewed, observed, and through the document materials studied. The method used in solving the assignment problem is the Hungarian method as assignment analysis due to the ineffectiveness of Human Resources and their work.

The data that will be used in this study is about the travel time of each courier in sending packages with the assumption that each courier sends packages with different total targets between partner couriers and organic couriers with the same traffic conditions.(Lestari 2015) in his research stated that time is a symbolic displacement in terms of place, which means moving from one point to another for a period of time, and then measuring the speed of displacement in units of time.

To obtain the data and information needed in the preparation of this thesis, the authors conducted research on CV. Anteraja Margahayu Branch located in Bekasi. The time period used to research is 1 month, starting from 1 – 31 May 2022. Twenty-two (22) delivery couriers are the total population for this study. The sampling technique used in this study is a saturated sampling technique or census. Primary data is data obtained directly from the object of research, namely data from interviews and observations or direct observations in CV. Anteraja Margahayu Branch which is carried out by recording based on the required data so that it can assist data processing. Secondary data is data obtained from journals and ebooks to add information and strengthen the results of research conducted. Data analysis was done manually using the Hungarian method.

RESULT AND DISCUSSION

CV. Anteraja is one of the expedition service startups that was founded on March 27, 2019 under PT. Tri Adi Bersama. CV. Anteraja is engaged in logistics covering all markets, including MSMEs. In Bekasi, CV. Anteraja opened several branches. One of the branches that will be the object of this research is the Margahayu branch which is located at Jl. HM. Joyomartono RT001/RW021 Margahayu Village, East Bekasi District, Bekasi City, West Java. The current courier allocation is that each delivery point is sent by 2 couriers which include partner couriers and organic couriers. Courier allocation CV. Anteraja Margahayu branch before using the Hungarian method, namely :

Table 1. Assignment Allocation of Organic Couriers Before Hungarian

Name	Destination	Time (Minute)	Total Pakages
Eko	Sepanjang Jaya	608	125
Dannies	RA Kartini	506	141
Charles	Perumahan Pondok Hijau	551	147
Irwin	Narogong	632	107

Dedi	Rawa Semut	526	131
Dewangga	Kampung Karya Logam	642	142
M. Adam	Dewi Sartika	582	133
Vially	Rawa Lumbu	628	160
Ade	Pengasinan	608	177
Rally	Bulak Kapal	625	125
Rovi	Perumahan Margahayu	696	136
Total		6.604	1.524

Table 2. Allocation of Partner Courier Assignments Before Hungrian

Name	Destination	Time (Minute)	Total Pakages
M. Irfan	Sepanjang Jaya	553	119
Adi	RA Kartini	648	122
Junaidi	Perumahan Pondok Hijau	614	110
Achmad	Narogong	580	124
Marcel	Rawa Semut	584	100
M. Rafli	Kampung Karya Logam	555	106
Joko	Dewi Sartika	700	117
Katon	Rawa Lumbu	743	108
Hamdan	Pengasinan	649	129
M. Rifay	Bulak Kapal	696	125
Juhans	Perumahan Margahayu	655	118
Total		6.977	1.278

Optimation of Organic Couriers

Time Optimation of Organic Couriers

Table 3. Identify into the Matrix and Determine the Smallest Value

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	608	0	0	435	0	674	640	0	0	0	0
Kartini	0	506	0	0	0	704	0	0	610	0	739
Perumahan Pondok Hijau	0	0	551	0	616	0	0	0	0	0	661
Narogong	0	475	0	632	0	0	0	570	550	574	0
Rawa Semut	587	0	575	0	526	0	726	0	0	0	0
Kampung Karya Logam	0	753	0	0	619	642	0	687	0	0	687
Dewi Sartika	0	0	0	0	0	0	582	0	587	553	0
Rawa Lumbu	0	0	553	553	0	0	0	628	0	0	0
Pengasinan	731	613	0	0	0	687	0	0	608	0	0
Bulak Kapal	0	0	0	600	505	0	0	583	0	625	0
Perumahan Margahayu	0	0	727	0	0	0	703	0	0	0	696

Table 4. Results of the Smallest Value Subtraction

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	173	435	435	0	435	239	205	435	435	435	435
Kartini	506	0	506	506	506	196	506	506	104	506	233

Perumahan Pondok Hijau	551	551	0	551	65	551	551	551	551	551	110
Narogong	574	99	574	58	574	574	574	4	24	0	574
Rawa Semut	0	587	12	587	61	587	139	587	587	587	587
Kampung Karya Logam	642	111	642	642	23	0	642	45	642	642	45
Dewi Sartika	582	582	582	582	582	582	0	582	5	29	582
Rawa Lumbu	628	628	75	75	628	628	628	0	628	628	628
Pengasinan	123	5	608	608	608	79	608	608	0	608	608
Bulak Kapal	505	505	505	95	0	505	505	78	505	120	505
Perumahan Margahayu	696	696	31	696	696	696	7	696	696	696	0

Table 5. Organic Courier Optimum Time

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	173	435	435	0	435	239	205	435	435	435	435
Kartini	506	0	506	506	506	196	506	506	104	506	233
Perumahan Pondok Hijau	551	551	0	551	65	551	551	551	551	551	110
Narogong	574	99	574	58	574	574	574	4	24	0	574
Rawa Semut	0	587	12	587	61	587	139	587	587	587	587
Kampung Karya Logam	642	111	642	642	23	0	642	45	642	642	45
Dewi Sartika	582	582	582	582	582	582	0	582	5	29	582
Rawa Lumbu	628	628	75	75	628	628	628	0	628	628	628
Pengasinan	123	5	608	608	608	79	608	608	0	608	608
Bulak Kapal	505	505	505	95	0	505	505	78	505	120	505
Perumahan Margahayu	696	696	31	696	696	696	7	696	696	696	0

Table 6. Optimum Time for Organic Courier CV. Anteraja Margahayu Branch

Name	Destination	Time (Minute)
Irwin	Sepanjang Jaya	435
Dannies	RA Kartini	506
Charles	Perumahan Pondok Hijau	551
Rally	Narogong	574
Eko	Rawa Semut	587
Dewangga	Kampung Karya Logam	642
M. Adam	Dewi Sartika	582
Vially	Rawa Lumbu	628
Ade	Pengasinan	608
Dedi	Bulak Kapal	505
Rovi	Perumahan Margahayu	696
Total		6.314

Organic Courier package optimization

Table 7. Identify into the Matrix and Determine the Largest Value

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	125	0	0	176	0	124	117	0	0	0	0
Kartini	0	141	0	0	0	103	0	0	129	0	108
Perumahan Pondok Hijau	0	0	147	0	112	0	0	0	0	0	127
Narogong	0	131	0	107	0	0	0	133	126	148	0
Rawa Semut	196	0	155	0	131	0	129	0	0	0	0
Kampung Karya Logam	0	141	0	0	134	142	0	111	0	0	134
Dewi Sartika	0	0	0	0	0	0	133	0	117	100	0
Rawa Lumbu	0	0	126	108	0	0	0	160	0	0	0
Pengasinan	138	101	0	0	0	108	0	0	177	0	0
Bulak Kapal	0	0	0	124	132	0	0	114	0	125	0
Perumahan Margahayu	0	0	110	0	0	0	130	0	0	0	136

Table 8. Results of the Largest Value Subtraction

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	51	176	176	0	176	52	59	176	176	176	176
Kartini	141	0	141	141	141	38	141	141	12	141	33
Perumahan Pondok Hijau	147	147	0	147	35	147	147	147	147	147	20
Narogong	148	17	148	41	148	148	148	15	22	0	148
Rawa Semut	0	196	41	196	65	196	67	196	196	196	196
Kampung Karya Logam	142	1	142	142	8	0	142	31	142	142	8
Dewi Sartika	133	133	133	133	133	133	0	133	16	33	133
Rawa Lumbu	160	160	34	52	160	160	160	0	160	160	160
Pengasinan	39	76	177	177	177	69	177	177	0	177	177
Bulak Kapal	132	132	132	8	0	132	132	18	132	7	132
Perumahan Margahayu	136	136	26	136	136	136	6	136	136	136	0

Table 9. Optimum Organic Courier Packages

Name / Destination	Eko	Dannies	Charles	Irwin	Dedi	Dewangga	M. Adam	Vially	Ade	Rally	Rovi
Sepanjang Jaya	51	176	176	0	176	52	59	176	176	176	176
Kartini	141	0	141	141	141	38	141	141	12	141	33
Perumahan Pondok Hijau	147	147	0	147	35	147	147	147	147	147	20
Narogong	148	17	148	41	148	148	148	15	22	0	148
Rawa Semut	0	196	41	196	65	196	67	196	196	196	196
Kampung Karya Logam	142	1	142	142	8	0	142	31	142	142	8

Dewi Sartika	133	133	133	133	133	133	0	133	16	33	133
Rawa Lumbu	160	160	34	52	160	160	160	0	160	160	160
Pengasinan	39	76	177	177	177	69	177	177	0	177	177
Bulak Kapal	132	132	132	8	0	132	132	18	132	7	132
Perumahan Margahayu	136	136	26	136	136	136	6	136	136	136	0

Table 10. Optimum Assignment of Organic Couriers

Name	Destination	Time (Minute)	Total Pakages
Irwin	Sepanjang Jaya	435	176
Dannies	RA Kartini	506	141
Charles	Perumahan Pondok Hijau	551	147
Rally	Narogong	574	148
Eko	Rawa Semut	587	196
Dewangga	Kampung Karya Logam	642	142
M. Adam	Dewi Sartika	582	133
Vially	Rawa Lumbu	628	160
Ade	Pengasinan	608	177
Dedi	Bulak Kapal	505	132
Rovi	Perumahan Margahayu	696	136
Total		6.314	1.688

Optimation of Partner courier

Partner Courier Time Optimization

Table 11. Identify into the Matrix and Determine the Smallest Value

Name / Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	553	772	0	0	440	0	0	0	0	634	774
Kartini	0	648	0	674	0	561	0	478	0	0	0
Perumahan Pondok Hijau	0	0	514	0	0	0	405	0	0	0	620
Narogong	0	0	0	580	0	633	0	0	648	0	0
Rawa Semut	542	0	0	0	584	0	0	0	0	631	0
Kampung Karya Logam	0	791	0	484	0	555	0	566	0	552	0
Dewi Sartika	0	0	0	0	0	0	700	0	611	0	635
Rawa Lumbu	506	0	465	0	0	0	677	743	0	0	0
Pengasinan	0	0	0	0	685	0	0	720	649	0	0
Bulak Kapal	0	609	0	401	0	0	0	0	0	696	0
Perumahan Margahayu	0	0	505	0	0	648	0	0	0	0	655

Table 12. Results of the Smallest Value Subtraction

Name \ Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	113	332	440	440	0	440	440	440	440	194	334
Kartini	478	170	478	196	478	83	478	0	478	478	478
Perumahan Pondok Hijau	405	405	209	405	405	405	0	405	405	405	215
Narogong	580	580	580	0	580	53	580	580	68	580	580
Rawa Semut	0	542	542	542	42	542	542	542	542	89	542
Kampung Karya Logam	552	239	552	68	552	3	552	14	552	0	552
Dewi Sartika	635	635	635	635	635	635	65	635	24	635	0
Rawa Lumbu	41	465	0	465	465	465	212	278	465	465	465
Pengasinan	649	649	649	649	36	649	649	71	0	649	649
Bulak Kapal	609	0	609	208	609	609	609	609	609	87	609
Perumahan Margahayu	648	648	143	648	648	0	648	648	648	648	7

Table 13. Optimum Time Courier Partner

Name \ Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	113	332	440	440	**0**	440	440	440	440	194	334
Kartini	478	170	478	196	478	83	478	**0**	478	478	478
Perumahan Pondok Hijau	405	405	209	405	405	405	**0**	405	405	405	215
Narogong	580	580	580	**0**	580	53	580	580	68	580	580
Rawa Semut	**0**	542	542	542	42	542	542	542	542	89	542
Kampung Karya Logam	552	239	552	68	552	3	552	14	552	**0**	552
Dewi Sartika	635	635	635	635	635	635	65	635	24	635	**0**
Rawa Lumbu	41	465	**0**	465	465	465	212	278	465	465	465
Pengasinan	649	649	649	649	36	649	649	71	**0**	649	649
Bulak Kapal	609	**0**	609	208	609	609	609	609	609	87	609
Perumahan Margahayu	648	648	143	648	648	**0**	648	648	648	648	7

Table 14. Optimum Time Courier Partner CV. Anteraja Margahayu Branch

Name	Destination	Time (Minute)
Marcel	Sepanjang Jaya	440
Katon	RA Kartini	478
Joko	Perumahan Pondok Hijau	405
Achmad	Narogong	580
M. Irfan	Rawa Semut	542
M. Rifay	Kampung Karya Logam	552
Juhans	Dewi Sartika	635
Junaidi	Rawa Lumbu	465

Hamdan	Pengasinan	649
Adi	Bulak Kapal	609
M. Rafli	Perumahan Margahayu	648
Total		6.003

Package Optimization Partner Courier

Table 15. Identify into the Matrix and Determine the Largest Value

Name \ Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	119	97	0	100	125	0	0	0	0	118	120
Kartini	0	122	0	115	0	92	0	127	0	0	0
Perumahan Pondok Hijau	0	0	110	0	0	0	126	0	0	0	100
Narogong	0	0	0	124	0	110	0	0	108	0	0
Rawa Semut	130	0	0	0	100	0	0	0	0	94	0
Kampung Karya Logam	0	100	0	90	0	106	0	0	0	109	0
Dewi Sartika	0	0	0	0	0	0	117	0	111	0	131
Rawa Lumbu	120	0	126	0	0	0	98	108	0	0	0
Pengasinan	0	0	0	0	119	0	0	118	129	0	0
Bulak Kapal	0	126	0	104	0	0	0	0	0	125	0
Perumahan Margahayu	0	0	101	0	0	126	0	0	0	0	118

Table 16. Results of the Largest Value Subtraction

Name \ Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	6	28	125	25	0	125	125	125	125	7	5
Kartini	127	5	127	12	127	35	127	0	127	127	127
Perumahan Pondok Hijau	126	126	16	126	126	126	0	126	126	126	26
Narogong	124	124	124	0	124	14	124	124	16	124	124
Rawa Semut	0	130	130	130	30	130	130	130	130	36	130
Kampung Karya Logam	109	9	109	19	109	3	109	109	109	0	109
Dewi Sartika	131	131	131	131	131	131	14	131	20	131	0
Rawa Lumbu	6	126	0	126	126	126	28	18	126	126	126
Pengasinan	129	129	129	129	10	129	129	11	0	129	129
Bulak Kapal	126	0	126	22	126	126	126	126	126	1	126
Perumahan Margahayu	126	126	25	126	126	0	126	126	126	126	8

Table 17. Optimum Packages Courier Partner

Name \ Destination	M. Irfan	Adi	Junaidi	Achmad	Marcel	M. Rafli	Joko	Katon	Hamdan	M. Rifay	Juhans
Sepanjang Jaya	6	28	125	25	0	125	125	125	125	7	5
Kartini	127	5	127	12	127	35	127	0	127	127	127
Perumahan Pondok Hijau	126	126	16	126	126	126	0	126	126	126	26

Narogong	124	124	124	**0**	124	14	124	124	16	124	124
Rawa Semut	**0**	130	130	130	30	130	130	130	130	36	130
Kampung Karya Logam	109	9	109	19	109	3	109	109	109	**0**	109
Dewi Sartika	131	131	131	131	131	131	14	131	20	131	**0**
Rawa Lumbu	6	126	**0**	126	126	126	28	18	126	126	126
Pengasinan	129	129	129	129	10	129	129	11	**0**	129	129
Bulak Kapal	126	**0**	126	22	126	126	126	126	126	1	126
Perumahan Margahayu	126	126	25	126	126	**0**	126	126	126	126	8

Table 18. Optimum Packages Courier Partner

Name	Destination	Time (Minute)	Total Pakages
Marcel	Sepanjang Jaya	440	125
Katon	RA Kartini	478	127
Joko	Perumahan Pondok Hijau	405	126
Achmad	Narogong	580	124
M. Irfan	Rawa Semut	542	130
M. Rifay	Kampung Karya Logam	552	109
Juhans	Dewi Sartika	635	131
Junaidi	Rawa Lumbu	465	126
Hamdan	Pengasinan	649	129
Adi	Bulak Kapal	609	126
M. Rafli	Perumahan Margahayu	648	126
Total		6.003	1.379

So it can be seen that the allocation of Partner Courier assignments is not optimal when viewed from the total time and package before using the Hungarian method. However, after using the Hungarian method, the total package delivery time and the total packets sent were more optimal both in terms of time and number of package deliveries.

CONCLUSSIONS

Based on data analysis from the discussion that has been carried out, the authors can draw the following conclusions:

1. The total delivery time organic courier before using the Hungarian method was 6,604, while after using the Hungarian method the total time was 6,314. There is a difference of 290 minutes.
2. The total package sent by organic couriers before using the Hungarian method was 1,451, while after using the Hungarian method the total time was 1,579. There is a difference of 128 packages.
3. The total delivery time of partner couriers before using the Hungarian method is 6,977, while after using the Hungarian method the total time is 6,003. There is a difference of 974 minutes.
4. The total package sent by organic couriers before using the Hungarian method was 1,284, while after using the Hungarian method the total time was 1,367. There is a difference of 83 packages.

5. Based on the results of the conclusions above, the application of the Hungarian method can be used to optimize the assignment of couriers to CV. Anteraja Margahayu branch.

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