

LAMPIRAN

Lampiran 1 Penghematan *Saving Matrix*

Penghematan zona 1

- $S(W1, W3) = J(Dc, W1) + J(Dc, W3) - J(W1, W3)$
 $= 25 + 6 - 14 = 17 \text{ km}$
- $S(W1, W4) = J(Dc, W1) + J(Dc, W4) - J(W1, W4)$
 $= 25 + 25 - 10 = 40 \text{ km}$
- $S(W1, W5) = J(Dc, W1) + J(Dc, W5) - J(W1, W5)$
 $= 25 + 17.5 - 15.4 = 27.1 \text{ km}$
- $S(W1, W6) = J(Dc, W1) + J(Dc, W6) - J(W1, W6)$
 $= 25 + 15 - 16.2 = 23.8 \text{ km}$
- $S(W1, W7) = J(Dc, W1) + J(Dc, W7) - J(W1, W7)$
 $= 25 + 10.4 - 25 = 10.4 \text{ km}$
- $S(W1, W8) = J(Dc, W1) + J(Dc, W8) - J(W1, W8)$
 $= 25 + 9 - 15.5 = 18.5 \text{ km}$
- $S(W1, W9) = J(Dc, W1) + J(Dc, W9) - J(W1, W9)$
 $= 25 + 12.5 - 13.8 = 23.7 \text{ km}$
- $S(W2, W3) = J(Dc, W2) + J(Dc, W3) - J(W2, W3)$
 $= 5 + 6 - 3.5 = 7.8 \text{ km}$
- $S(W2, W4) = J(Dc, W2) + J(Dc, W4) - J(W2, W4)$
 $= 5 + 25 - 18 = 12 \text{ km}$
- $S(W2, W5) = J(Dc, W2) + J(Dc, W5) - J(W2, W5)$
 $= 5 + 17.5 - 15.5 = 7 \text{ km}$
- $S(W2, W6) = J(Dc, W2) + J(Dc, W6) - J(W2, W6)$
 $= 5 + 15 - 16.5 = 3.5 \text{ km}$
- $S(W2, W7) = J(Dc, W2) + J(Dc, W7) - J(W2, W7)$
 $= 5 + 10.4 - 12 = 3.4 \text{ km}$
- $S(W2, W8) = J(Dc, W2) + J(Dc, W8) - J(W2, W8)$
 $= 5 + 9 - 10.1 = 3.9 \text{ km}$
- $S(W2, W9) = J(Dc, W2) + J(Dc, W9) - J(W2, W9)$
 $= 5 + 12.5 - 4.5 = 13 \text{ km}$
- $S(W3, W4) = J(Dc, W3) + J(Dc, W4) - J(W3, W4)$
 $= 6 + 25 - 18.8 = 18.8 \text{ km}$
- $S(W3, W5) = J(Dc, W3) + J(Dc, W5) - J(W3, W5)$
 $= 6 + 17.5 - 15 = 8.5 \text{ km}$

- S (W3,W6) = $J(Dc,W3) + J(Dc,W6) - J(W3,W6)$
= $6 + 15 - 14.3 = 6.7$ km
- S (W3,W7) = $J(Dc,W3) + J(Dc,W7) - J(W3,W7)$
= $6 + 10.4 - 10.9 = 5.5$ km
- S (W3,W8) = $J(Dc,W3) + J(Dc,W8) - J(W3,W8)$
= $6 + 9 - 7.4 = 7.6$ km
- S (W3,W9) = $J(Dc,W3) + J(Dc,W9) - J(W3,W9)$
= $6 + 12.5 - 5 = 13.5$ km
- S (W4,W5) = $J(Dc,W4) + J(Dc,W5) - J(W4,W5)$
= $25 + 17.5 - 22.5 = 20$ km
- S (W4,W6) = $J(Dc,W4) + J(Dc,W6) - J(W4,W6)$
= $25 + 15 - 24 = 16$ km
- S (W4,W7) = $J(Dc,W4) + J(Dc,W7) - J(W4,W7)$
= $25 + 10.4 - 26.8 = 8.6$ km
- S (W4,W8) = $J(Dc,W4) + J(Dc,W8) - J(W4,W8)$
= $25 + 9 - 20 = 14$ km
- S (W4,W9) = $J(Dc,W4) + J(Dc,W9) - J(W4,W9)$
= $25 + 12.5 - 17 = 20.5$ km
- S (W5,W6) = $J(Dc,W5) + J(Dc,W6) - J(W5,W6)$
= $17.5 + 15 - 2 = 30.5$ km
- S (W5,W7) = $J(Dc,W5) + J(Dc,W7) - J(W5,W7)$
= $17.5 + 10.4 - 19 = 8.9$ km
- S (W5,W8) = $J(Dc,W5) + J(Dc,W8) - J(W5,W8)$
= $17.5 + 9 - 8 = 18.5$ km
- S (W5,W9) = $J(Dc,W5) + J(Dc,W9) - J(W5,W9)$
= $17.5 + 12.5 - 13.9 = 16.1$ km
- S (W6,W7) = $J(Dc,W6) + J(Dc,W7) - J(W6,W7)$
= $15 + 10.4 - 22 = 3.4$ km
- S (W6,W8) = $J(Dc,W6) + J(Dc,W8) - J(W6,W8)$
= $15 + 9 - 9.7 = 14.3$ km
- S (W6,W9) = $J(Dc,W6) + J(Dc,W9) - J(W6,W9)$
= $15 + 12.5 - 11 = 16.5$ km
- S (W7,W8) = $J(Dc,W7) + J(Dc,W8) - J(W7,W8)$
= $10.4 + 9 - 14.5 = 4.9$ km
- S (W7,W9) = $J(Dc,W7) + J(Dc,W9) - J(W7,W9)$
= $10.4 + 12.5 - 17 = 5.9$ km
- S (W8,W9) = $J(Dc,W8) + J(Dc,W9) - J(W8,W9)$

$$= 9 + 12.5 - 7 = 14.5 \text{ km}$$

Penghematan zona 2

- $S(W10, W11) = J(Dc, W10) + J(Dc, W11) - J(W10, W11)$
 $= 170 + 178.5 - 25.5 = 223 \text{ Km}$

Penghematan zona 3

- $S(W12, W12) = J(Dc, W12) + J(Dc, W12) - J(W10, W11)$
 $= 195 + 195 - 390 = 0 \text{ km}$

Penghematan zona 4

- $S(W13, W14) = J(Dc, W13) + J(Dc, W14) - J(W13, W14)$
 $= 175 + 176.5 - 1.5 = 350 \text{ km}$
- $S(W13, W15) = J(Dc, W13) + J(Dc, W15) - J(W13, W15)$
 $= 175 + 150.5 - 37.7 = 287.8 \text{ km}$
- $S(W14, W15) = J(Dc, W14) + J(Dc, W15) - J(W14, W15)$
 $= 176.5 + 150.5 - 40 = 287 \text{ km}$

Lampiran 2 Rute Baru Setelah Penerapan Metode *Saving Matrix*

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
Juni	W1	W1 – W4	4.549.600 cm ³	3.840.000 cm ³	5.386.500 cm ³	19.942.200 cm ³
	W4		2.129.600 cm ³	1.728.000 cm ³	2.308.500 cm ³	
	W6	W6 – W5	4.985.200 cm ³	4.992.000 cm ³	4.941.000 cm ³	22.092.200 cm ³
	W5		2.662.000 cm ³	1.920.000 cm ³	2.592.000 cm ³	
	W3	W3 –W8 – W9	2.662.000 cm ³	1.920.000 cm ³	2.592.000 cm ³	22.742.800 cm ³
	W8		2.710.400 cm ³	2.880.000 cm ³	3.280.500 cm ³	
	W9		2.226.400 cm ³	1.920.000 cm ³	2.551.500 cm ³	
	W2	W2	3.388.000 cm ³	2.112.000 cm ³	2.025.000 cm ³	7.525.000 cm ³
	W7	W7	2.323.200 cm ³	1.920.000 cm ³	2.268.000 cm ³	6.511.200 cm ³
	W10	W10 – W11	4.404.400 cm ³	4.800.000 cm ³	5.265.000 cm ³	21.636.500 cm ³
	W11		2.371.600 cm ³	1.920.000 cm ³	2.875.500 cm ³	
	W12	W12	2.516.800 cm ³	1.920.000 cm ³	2.511.000 cm ³	6.947.800 cm ³
	W15	W15 – W13 – W14	1.597.200 cm ³	1.920.000 cm ³	2.835.000 cm ³	22.367.000 cm ³
	W13		2.420.000 cm ³	2.112.000 cm ³	3.442.500 cm ³	
	W14		2.758.800 cm ³	1.920.000 cm ³	3.361.500 cm ³	

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
Juli	W1	W1 – W4	4.598.000 cm ³	4.416.000 cm ³	5.265.000 cm ³	21.365.200 cm ³
	W4		2.565.200 cm ³	2.496.000 cm ³	2.025.000 cm ³	
	W6	W6 – W5	5.178.800 cm ³	4.608.000 cm ³	4.981.500 cm ³	21.841.300 cm ³
	W5		2.420.000 cm ³	2.304.000 cm ³	2.349.000 cm ³	
	W3	W3 – W8 – W9	2.807.200 cm ³	2.304.000 cm ³	2.511.000 cm ³	24.458.700 cm ³
	W8		2.807.200 cm ³	2.880.000 cm ³	3.847.500 cm ³	
	W9		2.516.800 cm ³	2.112.000 cm ³	2.673.000 cm ³	
	W2	W2	3.484.800 cm ³	1.728.000 cm ³	1.741.500 cm ³	6.954.300 cm ³
	W7	W7	2.807.200 cm ³	1.536.000 cm ³	2.511.000 cm ³	6.854.200 cm ³
	W10	W10 – W11	4.743.200 cm ³	4.416.000 cm ³	5.589.000 cm ³	22.034.200 cm ³
	W11		2.420.000 cm ³	2.112.000 cm ³	2.754.000 cm ³	
	W12	W12	2.420.000 cm ³	2.112.000 cm ³	2.794.500 cm ³	7.326.500 cm ³
	W15	W15 – W13 – W14	1.742.400 cm ³	2.112.000 cm ³	2.956.500 cm ³	22.481.700 cm ³
	W13		2.565.200 cm ³	2.304.000 cm ³	3.280.500 cm ³	
W14	2.371.600 cm ³		2.112.000 cm ³	3.037.500 cm ³		

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
Agustus	W1	W1 – W4	4.743.200 cm ³	4.224.000 cm ³	5.508.000 cm ³	21.318.300 cm ³
	W4		2.371.600 cm ³	1.920.000 cm ³	2.551.500 cm ³	
	W6	W6 – W5	5.082.000 cm ³	4.800.000 cm ³	4.941.000 cm ³	22.195.300 cm ³
	W5		2.516.800 cm ³	2.304.000 cm ³	2.551.500 cm ³	
	W3	W3 – W8 – W9	2.662.000 cm ³	2.496.000 cm ³	2.632.500 cm ³	23.423.500 cm ³
	W8		2.662.000 cm ³	2.880.000 cm ³	3.361.500 cm ³	
	W9		2.420.000 cm ³	1.920.000 cm ³	2.389.500 cm ³	
	W2	W2	3.533.200 cm ³	2.304.000 cm ³	1.944.000 cm ³	7.781.200 cm ³
	W7	W7	2.565.200 cm ³	2.304.000 cm ³	1.903.500 cm ³	6.772.700 cm ³
	W10	W10 – W11	4.259.200 cm ³	4.800.000 cm ³	5.670.000 cm ³	22.196.600 cm ³
	W11		2.226.400 cm ³	1.920.000 cm ³	3.321.000 cm ³	
	W12	W12	2.420.000 cm ³	2.112.000 cm ³	2.511.000 cm ³	7.043.000 cm ³
	W15	W15 – W13 – W14	1.597.200 cm ³	2.304.000 cm ³	2.713.500 cm ³	22.482.700 cm ³
	W13		2.420.000 cm ³	2.112.000 cm ³	3.442.500 cm ³	
W14	2.420.000 cm ³		2.112.000 cm ³	3.361.500 cm ³		

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
September	W1	W1 – W4	4.598.000 cm ³	4.800.000 cm ³	5.265.000 cm ³	21.497.200 cm ³
	W4		2.565.200 cm ³	1.920.000 cm ³	2.349.000 cm ³	
	W6	W6 – W5	4.840.000 cm ³	4.800.000 cm ³	5.022.000 cm ³	22.239.500 cm ³
	W5		2.662.000 cm ³	2.688.000 cm ³	2.227.500 cm ³	
	W3	W3 – W8 – W9	2.758.800 cm ³	2.112.000 cm ³	2.632.500 cm ³	24.005.300 cm ³
	W8		2.758.800 cm ³	2.880.000 cm ³	3.402.000 cm ³	
	W9		2.565.200 cm ³	2.304.000 cm ³	2.592.000 cm ³	
	W2	W2	3.388.000 cm ³	2.304.000 cm ³	2.106.000 cm ³	7.798.000 cm ³
	W7	W7	2.371.600 cm ³	2.112.000 cm ³	2.065.500 cm ³	6.549.100 cm ³
	W10	W10 – W11	4.259.200 cm ³	4.800.000 cm ³	5.305.500 cm ³	21.837.400 cm ³
	W11		2.323.200 cm ³	2.112.000 cm ³	3.037.500 cm ³	
	W12	W12	2.420.000 cm ³	1.920.000 cm ³	2.632.500 cm ³	6.972.500 cm ³
	W15	W15 – W13 – W14	1.694.000 cm ³	2.304.000 cm ³	2.835.000 cm ³	23.146.100 cm ³
	W13		2.662.000 cm ³	1.920.000 cm ³	3.523.500 cm ³	
W14	2.855.600 cm ³		2.112.000 cm ³	3.240.000 cm ³		

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
Oktober	W1	W1 – W4	4.694.800 cm ³	4.032.000 cm ³	5.467.500 cm ³	21.679.200 cm ³
	W4		2.710.400 cm ³	2.304.000 cm ³	2.470.500 cm ³	
	W6	W6 – W5	5.469.200 cm ³	4.416.000 cm ³	4.860.000 cm ³	21.661.400 cm ³
	W5		2.323.200 cm ³	1.920.000 cm ³	2.673.000 cm ³	
	W3	W3 – W8 – W9	2.855.600 cm ³	2.304.000 cm ³	2.430.000 cm ³	23.696.500 cm ³
	W8		2.565.200 cm ³	3.072.000 cm ³	3.564.000 cm ³	
	W9		2.323.200 cm ³	2.112.000 cm ³	2.470.500 cm ³	
	W2	W2	3.630.000 cm ³	1.920.000 cm ³	1.944.000 cm ³	7.494.000 cm ³
	W7	W7	2.371.600 cm ³	1.920.000 cm ³	2.065.500 cm ³	6.357.100 cm ³
	W10	W10 – W11	5.566.000 cm ³	3.840.000 cm ³	5.589.000 cm ³	22.413.000 cm ³
	W11		2.420.000 cm ³	1.920.000 cm ³	3.078.000 cm ³	
	W12	W12	2.565.200 cm ³	2.112.000 cm ³	2.592.000 cm ³	7.269.200 cm ³
	W15	W15 – W13 – W14	1.597.200 cm ³	1.920.000 cm ³	2.916.000 cm ³	22.212.400 cm ³
	W13		2.323.200 cm ³	2.496.000 cm ³	3.037.500 cm ³	
W14	2.662.000 cm ³		2.304.000 cm ³	2.956.500 cm ³		

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
November	W1	W1 – W4	4.646.400 cm ³	4.416.000 cm ³	5.508.000 cm ³	21.443.500 cm ³
	W4		2.371.600 cm ³	2.112.000 cm ³	2.389.500 cm ³	
	W6	W6 – W5	5.033.600 cm ³	4.800.000 cm ³	4.981.500 cm ³	22.689.200 cm ³
	W5		2.613.600 cm ³	2.304.000 cm ³	2.956.500 cm ³	
	W3	W3 – W8 – W9	2.662.000 cm ³	1.920.000 cm ³	2.592.000 cm ³	23.654.900 cm ³
	W8		2.710.400 cm ³	2.880.000 cm ³	3.240.000 cm ³	
	W9		2.420.000 cm ³	2.112.000 cm ³	3.118.500 cm ³	
	W2	W2	3.533.200 cm ³	1.920.000 cm ³	2.025.000 cm ³	7.478.200 cm ³
	W7	W7	2.516.800 cm ³	2.112.000 cm ³	2.227.500 cm ³	6.856.300 cm ³
	W10	W10 – W11	4.743.200 cm ³	4.416.000 cm ³	5.427.000 cm ³	22.328.200 cm ³
	W11		2.420.000 cm ³	1.920.000 cm ³	3.402.000 cm ³	
	W12	W12	2.420.000 cm ³	2.112.000 cm ³	2.713.500 cm ³	7.245.500 cm ³
	W15	W15 – W13 – W14	1.936.000 cm ³	2.112.000 cm ³	2.713.500 cm ³	23.384.500 cm ³
	W13		2.807.200 cm ³	2.304.000 cm ³	3.159.000 cm ³	
W14	3.000.800 cm ³		2.112.000 cm ³	3.240.000 cm ³		

Periode	Warehouse	Rute	Kipas Angin	Blender	Kompur Gas	Total Volume
Desember	W1	W1 – W4	4.598.000 cm ³	4.224.000 cm ³	5.386.500 cm ³	21.652.300 cm ³
	W4		2.274.800 cm ³	2.496.000 cm ³	2.673.000 cm ³	
	W6	W6 – W5	5.130.400 cm ³	4.416.000 cm ³	4.860.000 cm ³	21.152.700 cm ³
	W5		2.274.800 cm ³	1.920.000 cm ³	2.551.500 cm ³	
	W3	W3 –W8 – W9	2.758.800 cm ³	2.304.000 cm ³	2.551.500 cm ³	23.779.100 cm ³
	W8		2.758.800 cm ³	3.072.000 cm ³	3.523.500 cm ³	
	W9		2.420.000 cm ³	1.920.000 cm ³	2.470.500 cm ³	
	W2	W2	3.339.600 cm ³	2.304.000 cm ³	2.025.000 cm ³	7.668.600 cm ³
	W7	W7	2.178.000 cm ³	1.920.000 cm ³	2.025.000 cm ³	6.123.000 cm ³
	W10	W10 – W11	5.033.600 cm ³	4.032.000 cm ³	5.589.000 cm ³	22.143.100 cm ³
	W11		2.420.000 cm ³	2.112.000 cm ³	2.956.500 cm ³	
	W12	W12	2.516.800 cm ³	1.920.000 cm ³	2.349.000 cm ³	6.785.800 cm ³
	W15	W15 – W13 – W14	2.081.200 cm ³	1.920.000 cm ³	2.754.000 cm ³	22.836.900 cm ³
	W13		2.613.600 cm ³	2.304.000 cm ³	3.159.000 cm ³	
	W14		2.855.600 cm ³	2.112.000 cm ³	3.037.500 cm ³	

Lampiran 3 Gambar Produk Dan Gambar Alat Angkut





