

UJI KENORMALAN DATA

Uji Kenormalan Data Untuk RON 1500 ml

Berikut ini *output* uji kenormalan data menggunakan SPSS:

Tabel A.1
Uji Kenormalan Data RON 1500 ml

One-Sample Kolmogorov-Smirnov Test

| | | Batujajar | Cicadas | Cihanjuang | Kopo | Kordon | Leuwi panjang | Moh. Ramdan | Pagarsih | Sarimanah | Singosari |
|---------------------------|----------------|-----------|---------|------------|---------|---------|---------------|-------------|----------|-----------|-----------|
| N | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Normal | Mean | 12.3333 | 47.8333 | 51.0000 | 36.1667 | 24.1667 | 48.6667 | 101.5000 | 63.8333 | 86.6667 | 12.0000 |
| Parameters ^{a,b} | Std. Deviation | 1.63299 | 5.70672 | 5.76194 | 5.91326 | 1.72240 | 4.32049 | 9.81326 | 8.20772 | 9.75021 | .89443 |
| Most Extreme | Absolute | .180 | .218 | .236 | .204 | .295 | .183 | .140 | .194 | .208 | .202 |
| Differences | Positive | .154 | .218 | .184 | .204 | .148 | .136 | .139 | .160 | .184 | .202 |
| | Negative | -.180 | -.178 | -.236 | -.184 | -.295 | -.183 | -.140 | -.194 | -.208 | -.202 |
| Kolmogorov-Smirnov Z | | .440 | .533 | .577 | .499 | .722 | .449 | .343 | .476 | .509 | .494 |
| Asymp. Sig. (2-tailed) | | .990 | .938 | .893 | .964 | .674 | .988 | 1.000 | .977 | .958 | .968 |

a. Test distribution is Normal.

b. Calculated from data.

Kesimpulan uji kenormalan data RON88 1500 ml adalah:

1. Retailer Batujajar

Nilai Z berada = 0.440, berada di antara -1.96 dan 1.96

Nilai Asymp. Sig. (2-tailed) = 0.990 > 0.025 ($1/2$ alpha)

Data permintaan pada Retailer Batujajar normal

2. Retailer Cicadas

Nilai Z berada = 0.533, berada di antara -1.96 dan 1.96.

Nilai Asymp. Sig. (2-tailed) = 0.938 > 0.025 ($1/2$ alpha).

Data permintaan pada Retailer Cicadas normal.

3. Retailer Cihanjuang

Nilai Z berada = 0.577, berada di antara -1.96 dan 1.96.

Nilai Asymp. Sig. (2-tailed) = 0.893 > 0.025 ($1/2$ alpha).

Data permintaan pada Retailer Cihanjuang normal.

4. Retailer Kopo 373
Nilai Z berada = 0.499, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.964 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kopo 373 normal.
5. Retailer Kordon
Nilai Z berada = 0.722, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.674 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kordon normal.
6. Retailer Leuwipanjang
Nilai Z berada = 0.449, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.988 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Leuwipanjang normal.
7. Retailer Moh.Ramdan
Nilai Z berada = 0.343, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 1.000 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Moh. Ramdan normal.
8. Retailer Pagarsih
Nilai Z berada = 0.476, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.977 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Pagarsih normal.
9. Retailer Sarimanah
Nilai Z berada = 0.509, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.958 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Sarimanah normal.
10. Retailer Singosari
Nilai Z berada = 0.494, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.968 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Singosari normal.

Uji Kenormalan Data Untuk RON 620 ml

Berikut ini *output* uji kenormalan data menggunakan SPSS:

Tabel A.2
Uji Kenormalan Data RON 620 ml

| | | One-Sample Kolmogorov-Smirnov Test | | | | | | | | | |
|----------------------------------|----------------|------------------------------------|---------------------|------------|----------|---------|---------------|-------------|----------|-----------|---------------------|
| | | Batujajar | Cicadas | Cihanjuang | Kopo | Kordon | Leuwi panjang | Moh. Ramdan | Pagarsih | Sarimanah | Singosari |
| N | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Normal Parameters ^{a,b} | Mean | 68.3333 | .0000 | 51.6667 | 122.1667 | 24.3333 | 46.8333 | 89.6667 | 49.5000 | 74.8333 | .0000 |
| | Std. Deviation | 5.95539 | .00000 ^c | 3.93277 | 14.56594 | 2.25093 | 5.19294 | 10.76414 | 5.12835 | 10.70358 | .00000 ^c |
| Most Extreme Differences | Absolute | .181 | | .234 | .250 | .270 | .229 | .232 | .282 | .277 | |
| | Positive | .131 | | .234 | .164 | .223 | .118 | .232 | .231 | .238 | |
| | Negative | -.181 | | -.198 | -.250 | -.270 | -.229 | -.187 | -.282 | -.277 | |
| Kolmogorov-Smirnov Z | | .443 | | .573 | .613 | .663 | .561 | .569 | .690 | .679 | |
| Asymp. Sig. (2-tailed) | | .989 | | .898 | .847 | .772 | .911 | .903 | .728 | .746 | |

a. Test distribution is Normal.

b. Calculated from data.

c. The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

Kesimpulan uji kenormalan data RON88 620ml adalah:

- Untuk Retailer Batujajar:
Nilai Z berada = 0.443, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.989 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Batujajar normal.
- Untuk Retailer Cicadas:
Tidak ada data untuk variabel Cicadas.
- Untuk Retailer Cihanjuang:
Nilai Z berada = 0.573, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.898 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Cihanjuang normal.
- Untuk Retailer Kopo 373:
Nilai Z berada = 0.613, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.847 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kopo 373 normal.
- Untuk Retailer Kordon:
Nilai Z berada = 0.663, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.772 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kordon normal.
- Untuk Retailer Leuwipanjang:
Nilai Z berada = 0.561, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.911 > 0.025 ($1/2$ alpha).

- Data permintaan pada Retailer Leuwipanjang normal.
7. Untuk Retailer Moh.Ramdan:
 Nilai Z berada = 0.569, berada di antara -1.96 dan 1.96.
 Nilai Asymp. Sig. (2-tailed) = 0.903 > 0.025 ($1/2$ alpha).
 Data permintaan pada Retailer Moh.Ramdan normal.
8. Untuk Retailer Pagarsih:
 Nilai Z berada = 0.690, berada di antara -1.96 dan 1.96.
 Nilai Asymp. Sig. (2-tailed) = 0.728 > 0.025 ($1/2$ alpha).
 Data permintaan pada Retailer Pagarsih normal.
9. Untuk Retailer Sarimanah:
 Nilai Z berada = 0.679, berada di antara -1.96 dan 1.96.
 Nilai Asymp. Sig. (2-tailed) = 0.746 > 0.025 ($1/2$ alpha).
 Data permintaan pada Retailer Sarimanah normal.
10. Untuk Retailer Singosari:
 Tidak ada data untuk variabel Singosari.

Uji Kenormalan Data Untuk RON 250 ml

Berikut ini *output* uji kenormalan data menggunakan SPSS:

Tabel A.3
 Uji Kenormalan Data RON 250 ml

| | | One-Sample Kolmogorov-Smirnov Test | | | | | | | | | |
|----------------------------------|----------------|------------------------------------|----------|------------|----------|----------|---------------|-------------|----------|-----------|-----------|
| | | Batujajar | Cicadas | Cihanjuang | Kopo | Kordon | Leuwi panjang | Moh. Ramdan | Pagarsih | Sarimanah | Singosari |
| N | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Normal Parameters ^{a,b} | Mean | .0000 | 295.3333 | 569.6667 | 543.5000 | 161.5000 | 372.1667 | 1025.5000 | 474.8333 | 1456.1667 | 735.3333 |
| | Std. Deviation | .00000 ^c | 35.50023 | 71.87118 | 82.20401 | 12.37336 | 54.67876 | 117.91989 | 50.00967 | 128.12559 | 94.16723 |
| Most Extreme Differences | Absolute | | .176 | .335 | .246 | .228 | .267 | .211 | .364 | .192 | .219 |
| | Positive | | .137 | .221 | .246 | .177 | .213 | .153 | .364 | .152 | .219 |
| | Negative | | -.176 | -.335 | -.158 | -.228 | -.267 | -.211 | -.237 | -.192 | -.188 |
| Kolmogorov-Smirnov Z | | | .431 | .821 | .603 | .558 | .653 | .516 | .891 | .471 | .536 |
| Asymp. Sig. (2-tailed) | | | .992 | .510 | .860 | .915 | .788 | .953 | .405 | .980 | .936 |

a. Test distribution is Normal.

b. Calculated from data.

c. The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

Kesimpulan uji kenormalan data RON88 250 ml adalah:

- Untuk Retailer Batujajar:
 Tidak ada data untuk variabel Batujajar.
- Untuk Retailer Cicadas:
 Nilai Z berada = 0.431, berada di antara -1.96 dan 1.96.

- Nilai Asymp. Sig. (2-tailed) = 0.992 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Batujajar normal.
3. Untuk Retailer Cihanjuang:
Nilai Z berada = 0.821, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.510 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Cihanjuang normal.
 4. Untuk Retailer Kopo 373:
Nilai Z berada = 0.603, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.860 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kopo 373 normal.
 5. Untuk Retailer Kordon:
Nilai Z berada = 0.558, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.915 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Kordon normal.
 6. Untuk Retailer Leuwipanjang:
Nilai Z berada = 0.653, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.788 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Leuwipanjang normal.
 7. Untuk Retailer Moh.Ramdan:
Nilai Z berada = 0.516, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.953 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Moh.Ramdan normal.
 8. Untuk Retailer Pagarsih:
Nilai Z berada = 0.891, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.405 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Pagarsih normal.
 9. Untuk Retailer Sarimanah:
Nilai Z berada = 0.471, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.980 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Sarimanah normal.
 10. Untuk Retailer Singosari:
Nilai Z berada = 0.536, berada di antara -1.96 dan 1.96.
Nilai Asymp. Sig. (2-tailed) = 0.936 > 0.025 ($1/2$ alpha).
Data permintaan pada Retailer Singosari normal.

PERAMALAN PERMINTAAN DENGAN MENGUNAKAN WINQSB

1. Peramalan pada Retailer Batujajar

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 38.11 | | | | | | | | |
| 2 | 41.28 | 38.11 | 3.169998 | 3.169998 | 3.169998 | 10.04889 | 7.679259 | 1 | |
| 3 | 42 | 39.695 | 2.305 | 5.474998 | 2.737499 | 7.680957 | 6.583678 | 2 | |
| 4 | 43.35 | 40.46333 | 2.886665 | 8.361664 | 2.787221 | 7.898251 | 6.608777 | 3 | |
| 5 | 41.76 | 41.185 | 0.5750008 | 8.936665 | 2.234166 | 6.006344 | 5.300812 | 4 | |
| 6 | 36.97 | 41.3 | -4.329994 | 4.60667 | 2.653332 | 8.554846 | 6.583086 | 1.736183 | 0.474696 |
| 7 | | 40.57833 | | | | | | | |
| 8 | | 40.57833 | | | | | | | |
| 9 | | 40.57833 | | | | | | | |
| 10 | | 40.57833 | | | | | | | |
| 11 | | 40.57833 | | | | | | | |
| 12 | | 40.57833 | | | | | | | |
| 13 | | 40.57833 | | | | | | | |
| 14 | | 40.57833 | | | | | | | |
| 15 | | 40.57833 | | | | | | | |
| 16 | | 40.57833 | | | | | | | |
| 17 | | 40.57833 | | | | | | | |
| 18 | | 40.57833 | | | | | | | |
| CFE | | | 4.60667 | | | | | | |
| MAD | | | 2.653332 | | | | | | |
| MSE | | | 8.554846 | | | | | | |
| MAPE | | | 6.583086 | | | | | | |
| Trk.Signal | | | 1.736183 | | | | | | |
| R-square | | | 0.474696 | | | | | | |

- *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 38.11 | | | | | | | | | | | |
| 2 | 41.28 | | | | | | | | | | | |
| 3 | 42 | 39.695 | | | | | | | | | | |
| 4 | 43.35 | 41.64 | 40.46333 | | | | | | | | | |
| 5 | 41.76 | 42.675 | 42.21 | 41.185 | | | | | | | | |
| 6 | 36.97 | 42.555 | 42.37 | 42.0975 | 41.3 | -4.329994 | -4.329994 | 4.329994 | 18.74885 | 11.71218 | -1 | |
| 7 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 8 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 9 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 10 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 11 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 12 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 13 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 14 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 15 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 16 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 17 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| 18 | | 39.385 | 40.69333 | 41.02 | 41.072 | | | | | | | |
| CFE | | -2.485001 | -2.963333 | -4.552434 | -4.329994 | | | | | | | |
| MAD | | 2.62875 | 2.912221 | 2.851248 | 4.329994 | | | | | | | |
| MSE | | 10.06854 | 12.5651 | 13.31091 | 18.74885 | | | | | | | |
| MAPE | | 6.682666 | 7.447654 | 7.623128 | 11.71218 | | | | | | | |
| Trk.Signal | | -0.9453165 | -1.017951 | -1.596667 | -1 | | | | | | | |
| R-square | | 0.3100027 | 0.2341186 | 0.9395843 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- Weighted moving average

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|-----------|----------|---------|----------|--------------------|----------|
| 1 | 38.11 | | | | | | | | | | | |
| 2 | 41.28 | | | | | | | | | | | |
| 3 | 42 | 39.16667 | | | | | | | | | | |
| 4 | 43.35 | 41.52 | 39.915 | | | | | | | | | |
| 5 | 41.76 | 42.45 | 41.865 | 40.363 | | | | | | | | |
| 6 | 36.97 | 42.82 | 42.41 | 41.958 | 40.67533 | -3.705334 | -3.705334 | 3.705334 | 13.7295 | 10.02254 | -1 | |
| 7 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 8 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 9 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 10 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 11 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 12 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 13 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 14 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 15 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 16 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 17 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| 18 | | 40.16333 | 41.75666 | 41.854 | 41.66266 | | | | | | | |
| CFE | | -1.876667 | -2.010002 | -3.591 | -3.705334 | | | | | | | |
| MAD | | 2.800832 | 3.026667 | 3.192499 | 3.705334 | | | | | | | |
| MSE | | 11.5188 | 14.03361 | 13.41587 | 13.7295 | | | | | | | |
| MAPE | | 7.110852 | 7.706877 | 8.418661 | 10.02254 | | | | | | | |
| Trk. Signal | | -0.6700392 | -0.6640975 | -1.124824 | -1 | | | | | | | |
| R-square | | 0.3043172 | 0.230002 | 0.6729117 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- Single exponential smoothing

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|-----------|----------|----------|----------|--------------------|-----------|
| 1 | 38.11 | | | | | | | | |
| 2 | 41.28 | 38.11 | 3.169998 | 3.169998 | 3.169998 | 10.04889 | 7.679259 | 1 | |
| 3 | 42 | 41.27999 | 0.720005 | 3.890003 | 1.945002 | 5.283648 | 4.696778 | 2 | |
| 4 | 43.35 | 42 | 1.349998 | 5.240002 | 1.746667 | 4.12993 | 4.169247 | 3 | |
| 5 | 41.76 | 43.35 | -1.59 | 3.650002 | 1.7075 | 3.729473 | 4.078803 | 2.137628 | |
| 6 | 36.97 | 41.76 | -4.789997 | -1.139996 | 2.324 | 7.572393 | 5.854331 | -0.4905317 | 0.6557605 |
| 7 | | 36.97001 | | | | | | | |
| 8 | | 36.97001 | | | | | | | |
| 9 | | 36.97001 | | | | | | | |
| 10 | | 36.97001 | | | | | | | |
| 11 | | 36.97001 | | | | | | | |
| 12 | | 36.97001 | | | | | | | |
| 13 | | 36.97001 | | | | | | | |
| 14 | | 36.97001 | | | | | | | |
| 15 | | 36.97001 | | | | | | | |
| 16 | | 36.97001 | | | | | | | |
| 17 | | 36.97001 | | | | | | | |
| 18 | | 36.97001 | | | | | | | |
| CFE | | -1.139996 | | | | | | | |
| MAD | | 2.324 | | | | | | | |
| MSE | | 7.572393 | | | | | | | |
| MAPE | | 5.854331 | | | | | | | |
| Trk. Signal | | -0.4905317 | | | | | | | |
| R-square | | 0.6557605 | | | | | | | |
| | | Alpha=1 | | | | | | | |
| | | F(0)=38.11 | | | | | | | |

2. Peramalan pada Retailer Cicadas

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 103.17 | | | | | | | | |
| 2 | 99.67 | 103.17 | -3.5 | -3.5 | 3.5 | 12.25 | 3.511588 | -1 | |
| 3 | 89.17 | 101.42 | -12.25 | -15.75 | 7.875 | 81.15625 | 8.624697 | -2 | |
| 4 | 99.67 | 97.33667 | 2.33328 | -13.41667 | 6.027776 | 55.91897 | 6.530149 | -2.225808 | |
| 5 | 96.83 | 97.92 | -1.089996 | -14.50667 | 4.793331 | 42.23625 | 5.179032 | -3.026427 | |
| 6 | 93.83 | 97.702 | -3.872002 | -18.37867 | 4.609065 | 36.78748 | 4.968548 | -3.987505 | |
| 7 | | 97.05667 | | | | | | | |
| 8 | | 97.05667 | | | | | | | |
| 9 | | 97.05667 | | | | | | | |
| 10 | | 97.05667 | | | | | | | |
| 11 | | 97.05667 | | | | | | | |
| 12 | | 97.05667 | | | | | | | |
| 13 | | 97.05667 | | | | | | | |
| 14 | | 97.05667 | | | | | | | |
| 15 | | 97.05667 | | | | | | | |
| 16 | | 97.05667 | | | | | | | |
| 17 | | 97.05667 | | | | | | | |
| 18 | | 97.05667 | | | | | | | |
| CFE | | | -18.37867 | | | | | | |
| MAD | | | 4.609065 | | | | | | |
| MSE | | | 36.78748 | | | | | | |
| MAPE | | | 4.968548 | | | | | | |
| Trk.Signal | | | -3.987505 | | | | | | |
| R-square | | | | | | | | | |

- *Moving Average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|---------|----------|--------------------|----------|
| 1 | 103.17 | | | | | | | | | | | |
| 2 | 99.67 | | | | | | | | | | | |
| 3 | 89.17 | 101.42 | | | | | | | | | | |
| 4 | 99.67 | 94.42 | 97.33667 | | | | | | | | | |
| 5 | 96.83 | 94.42 | 96.17001 | 97.92 | | | | | | | | |
| 6 | 93.83 | 98.25 | 95.22334 | 96.335 | 97.702 | -3.872002 | -3.872002 | 3.872002 | 14.9924 | 4.126614 | -1 | |
| 7 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 8 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 9 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 10 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 11 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 12 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 13 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 14 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 15 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 16 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 17 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| 18 | | 95.33 | 96.77667 | 94.875 | 95.834 | | | | | | | |
| CFE | | -3.009996 | 1.539991 | -3.594994 | -3.872002 | | | | | | | |
| MAD | | 6.0825 | 1.462219 | 1.797497 | -3.872002 | | | | | | | |
| MSE | | 50.74237 | 2.507131 | 3.731552 | 14.9924 | | | | | | | |
| MAPE | | 6.551183 | 1.502537 | 1.8977 | 4.126614 | | | | | | | |
| Trk.Signal | | -1.481298 | 1.094221 | -2 | -1 | | | | | | | |
| R-square | | 0.9036889 | 0.1014205 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- *Weighted Moving Average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 103.17 | | | | | | | | | | | |
| 2 | 99.67 | | | | | | | | | | | |
| 3 | 89.17 | 102.0033 | | | | | | | | | | |
| 4 | 99.67 | 96.17001 | 99.67001 | | | | | | | | | |
| 5 | 96.83 | 92.67001 | 96.17001 | 98.97 | | | | | | | | |
| 6 | 93.83 | 98.72333 | 93.94666 | 96.23601 | 98.54733 | -4.717323 | -4.717323 | 4.717323 | 22.25314 | 5.027521 | -1 | |
| 7 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 8 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 9 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 10 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 11 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 12 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 13 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 14 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 15 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 16 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 17 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| 18 | | 95.82999 | 97.75 | 94.318 | 96.102 | | | | | | | |
| CFE | | -10.06667 | 0.5433273 | 4.546005 | 4.717323 | | | | | | | |
| MAD | | 6.346663 | 0.2588882 | 2.273003 | 4.717323 | | | | | | | |
| MSE | | 54.54886 | 0.1497349 | 5.184231 | 22.25314 | | | | | | | |
| MAPE | | 6.853713 | 0.2686476 | 2.387138 | 5.027521 | | | | | | | |
| Trk.Signal | | -1.586137 | 2.038635 | -2 | -1 | | | | | | | |
| R-square | | | 0.9819037 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- *Single Exponential Smoothing*

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|------------------|-------------|-----------------|----------------|-----------|----------|----------|----------|-----------------|----------|
| 1 | 103.17 | | | | | | | | |
| 2 | 99.67 | 103.17 | -3.5 | -3.5 | 3.5 | 12.25 | 3.511588 | -1 | |
| 3 | 89.17 | 101.525 | -12.355 | -15.855 | 7.927502 | 82.44805 | 8.683575 | -2 | |
| 4 | 99.67 | 95.71815 | 3.951843 | -11.90316 | 6.602282 | 60.17106 | 7.110693 | -1.802886 | |
| 5 | 96.83 | 97.57552 | -0.7455215 | -12.64868 | 5.138092 | 45.26724 | 5.525501 | -2.461747 | |
| 6 | 93.83 | 97.22513 | -3.395126 | -16.04381 | 4.789499 | 38.51917 | 5.144077 | -3.349788 | |
| 7 | | 95.62942 | | | | | | | |
| 8 | | 95.62942 | | | | | | | |
| 9 | | 95.62942 | | | | | | | |
| 10 | | 95.62942 | | | | | | | |
| 11 | | 95.62942 | | | | | | | |
| 12 | | 95.62942 | | | | | | | |
| 13 | | 95.62942 | | | | | | | |
| 14 | | 95.62942 | | | | | | | |
| 15 | | 95.62942 | | | | | | | |
| 16 | | 95.62942 | | | | | | | |
| 17 | | 95.62942 | | | | | | | |
| 18 | | 95.62942 | | | | | | | |
| CFE | | -16.04381 | | | | | | | |
| MAD | | 4.789499 | | | | | | | |
| MSE | | 38.51917 | | | | | | | |
| MAPE | | 5.144077 | | | | | | | |
| Trk. Signal | | -3.349788 | | | | | | | |
| R-square | | | | | | | | | |
| | | Alpha=0.47 | | | | | | | |
| | | F(0)=103.17 | | | | | | | |

3. Peramalan pada Retailer Cihanjuang

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|------------------|-------------|----------------|----------------|----------|----------|----------|----------|-----------------|-----------|
| 1 | 151.34 | | | | | | | | |
| 2 | 178.84 | 151.34 | 27.5 | 27.5 | 27.5 | 756.25 | 15.37687 | 1 | |
| 3 | 176.73 | 165.09 | 11.64 | 39.14 | 19.57 | 445.8698 | 10.9816 | 2 | |
| 4 | 177.25 | 168.97 | 8.280014 | 47.42001 | 15.80667 | 320.0994 | 8.878189 | 3 | |
| 5 | 167.33 | 171.04 | -3.709991 | 43.71002 | 12.7825 | 243.5156 | 7.212934 | 3.41952 | |
| 6 | 152.31 | 170.298 | -17.98801 | 25.72202 | 13.8236 | 259.5261 | 8.132373 | 1.860732 | 0.8055593 |
| 7 | | 167.3 | | | | | | | |
| 8 | | 167.3 | | | | | | | |
| 9 | | 167.3 | | | | | | | |
| 10 | | 167.3 | | | | | | | |
| 11 | | 167.3 | | | | | | | |
| 12 | | 167.3 | | | | | | | |
| 13 | | 167.3 | | | | | | | |
| 14 | | 167.3 | | | | | | | |
| 15 | | 167.3 | | | | | | | |
| 16 | | 167.3 | | | | | | | |
| 17 | | 167.3 | | | | | | | |
| 18 | | 167.3 | | | | | | | |
| CFE | | 25.72202 | | | | | | | |
| MAD | | 13.8236 | | | | | | | |
| MSE | | 259.5261 | | | | | | | |
| MAPE | | 8.132373 | | | | | | | |
| Trk. Signal | | 1.860732 | | | | | | | |
| R-square | | 0.8055593 | | | | | | | |

• *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 151.34 | | | | | | | | | | | |
| 2 | 178.84 | | | | | | | | | | | |
| 3 | 176.73 | 165.09 | | | | | | | | | | |
| 4 | 177.25 | 177.785 | 168.97 | | | | | | | | | |
| 5 | 167.33 | 176.99 | 177.6066 | 171.04 | | | | | | | | |
| 6 | 152.31 | 172.29 | 173.77 | 175.0375 | 170.290 | -17.98801 | -17.98801 | 17.98801 | 323.5684 | 11.81013 | -1 | |
| 7 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 8 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 9 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 10 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 11 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 12 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 13 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 14 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 15 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 16 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 17 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| 18 | | 159.82 | 165.63 | 168.405 | 170.492 | | | | | | | |
| CFE | | -18.53502 | -23.4566 | -26.43748 | -17.98801 | | | | | | | |
| MAD | | 10.45375 | 13.33888 | 13.21874 | 17.98801 | | | | | | | |
| MSE | | 157.0731 | 211.5662 | 265.1515 | 323.5684 | | | | | | | |
| MAPE | | 6.444792 | 8.300862 | 8.963918 | 11.81013 | | | | | | | |
| Trk. Signal | | -1.773049 | -1.758514 | -2 | -1 | | | | | | | |
| R-square | | 0.4605077 | 0.7003762 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

• *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 151.34 | | | | | | | | | | | |
| 2 | 178.84 | | | | | | | | | | | |
| 3 | 176.73 | 160.5067 | | | | | | | | | | |
| 4 | 177.25 | 178.1367 | 164.7383 | | | | | | | | | |
| 5 | 167.33 | 176.9033 | 177.8717 | 167.259 | | | | | | | | |
| 6 | 152.31 | 173.9433 | 175.3367 | 176.738 | 168.272 | -15.96201 | -15.96201 | 15.96201 | 254.7856 | 10.47995 | -1 | |
| 7 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 8 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 9 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 10 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 11 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 12 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 13 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 14 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 15 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 16 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 17 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| 18 | | 162.3233 | 169.7867 | 172.564 | 174.656 | | | | | | | |
| CFE | | -15.87 | -21.05666 | -24.35699 | -15.96201 | | | | | | | |
| MAD | | 12.07916 | 15.36 | 12.2495 | 15.96201 | | | | | | | |
| MSE | | 295.9862 | 265.9654 | 298.365 | 254.7856 | | | | | | | |
| MAPE | | 7.401168 | 9.492329 | 8.040395 | 10.47995 | | | | | | | |
| Trk. Signal | | -1.313832 | -1.370876 | -1.988408 | -1 | | | | | | | |
| R-square | | 0.6376142 | 0.7765425 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

• *Single exponential smoothing*

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 151.34 | | | | | | | | |
| 2 | 178.84 | 151.34 | 27.5 | 27.5 | 27.5 | 756.25 | 15.37687 | | 1 |
| 3 | 176.73 | 178.84 | -2.109985 | 25.39001 | 14.80499 | 380.351 | 8.285389 | 1.714963 | |
| 4 | 177.25 | 176.73 | 0.5200043 | 25.91002 | 10.04333 | 253.6575 | 5.621384 | 2.579823 | |
| 5 | 167.33 | 177.25 | -9.919998 | 15.99002 | 10.0125 | 214.8447 | 5.638139 | 1.597006 | |
| 6 | 152.31 | 167.33 | -15.02 | 0.9700165 | 11.014 | 216.9959 | 6.530805 | 8.807124E-02 | |
| 7 | | 152.31 | | | | | | | |
| 8 | | 152.31 | | | | | | | |
| 9 | | 152.31 | | | | | | | |
| 10 | | 152.31 | | | | | | | |
| 11 | | 152.31 | | | | | | | |
| 12 | | 152.31 | | | | | | | |
| 13 | | 152.31 | | | | | | | |
| 14 | | 152.31 | | | | | | | |
| 15 | | 152.31 | | | | | | | |
| 16 | | 152.31 | | | | | | | |
| 17 | | 152.31 | | | | | | | |
| 18 | | 152.31 | | | | | | | |
| CFE | | 0.9700165 | | | | | | | |
| MAD | | 11.014 | | | | | | | |
| MSE | | 216.9959 | | | | | | | |
| MAPE | | 6.530805 | | | | | | | |
| Trk. Signal | | 8.807124E-02 | | | | | | | |
| R-square | | | | | | | | | |
| | | Alpha=1 | | | | | | | |
| | | F(0)=151.34 | | | | | | | |

4. Peramalan pada Retailer Kopo 373

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|-----------|----------|----------|-----------|--------------------|-----------|
| 1 | 166.06 | | | | | | | | |
| 2 | 164.78 | 166.06 | -1.279999 | -1.279999 | 1.279999 | 1.638397 | 0.7767926 | -1 | |
| 3 | 192.62 | 165.42 | 27.2 | 25.92 | 14.24 | 370.7391 | 7.448929 | 1.820225 | 0.8673537 |
| 4 | 161.81 | 174.4866 | -12.67665 | 13.24335 | 13.71888 | 300.7253 | 7.57738 | 0.9653372 | 0.1898332 |
| 5 | 198.87 | 171.3175 | 27.55251 | 40.79585 | 17.17729 | 415.3291 | 9.146667 | 2.374988 | 0.4388312 |
| 6 | 179.33 | 176.828 | 2.502014 | 43.29787 | 14.24223 | 333.5153 | 7.596375 | 3.040104 | 0.4424867 |
| 7 | | 177.245 | | | | | | | |
| 8 | | 177.245 | | | | | | | |
| 9 | | 177.245 | | | | | | | |
| 10 | | 177.245 | | | | | | | |
| 11 | | 177.245 | | | | | | | |
| 12 | | 177.245 | | | | | | | |
| 13 | | 177.245 | | | | | | | |
| 14 | | 177.245 | | | | | | | |
| 15 | | 177.245 | | | | | | | |
| 16 | | 177.245 | | | | | | | |
| 17 | | 177.245 | | | | | | | |
| 18 | | 177.245 | | | | | | | |
| CFE | | 43.29787 | | | | | | | |
| MAD | | 14.24223 | | | | | | | |
| MSE | | 333.5153 | | | | | | | |
| MAPE | | 7.596375 | | | | | | | |
| Trk.Signal | | 3.040104 | | | | | | | |
| R-square | | 0.4424867 | | | | | | | |

- *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 166.06 | | | | | | | | | | | |
| 2 | 164.78 | | | | | | | | | | | |
| 3 | 192.62 | 165.42 | | | | | | | | | | |
| 4 | 161.81 | 178.7 | 174.4866 | | | | | | | | | |
| 5 | 198.87 | 177.215 | 173.07 | 171.3175 | | | | | | | | |
| 6 | 179.33 | 180.34 | 184.4333 | 179.52 | | 176.828 | 2.502014 | 2.502014 | 2.502014 | 6.260075 | 1.395201 | 1 |
| 7 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 8 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 9 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 10 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 11 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 12 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 13 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 14 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 15 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 16 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 17 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| 18 | | 189.1 | 180.0033 | 183.1575 | 179.482 | | | | | | | |
| CFE | | 30.995 | 8.02005 | 27.36252 | 2.502014 | | | | | | | |
| MAD | | 16.68875 | 14.52665 | 13.87125 | 2.502014 | | | | | | | |
| MSE | | 373.7677 | 284.1271 | 379.5883 | 6.260075 | | | | | | | |
| MAPE | | 9.002866 | 7.884448 | 6.980237 | 1.395201 | | | | | | | |
| Trk.Signal | | 1.854843 | 0.5520921 | 1.922607 | 1 | | | | | | | |
| R-square | | 0.468203 | 0.1427547 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 166.06 | | | | | | | | | | | |
| 2 | 164.78 | | | | | | | | | | | |
| 3 | 192.62 | 165.6333 | | | | | | | | | | |
| 4 | 161.81 | 174.06 | 170.06 | | | | | | | | | |
| 5 | 198.87 | 182.35 | 173.565 | 170.563 | | | | | | | | |
| 6 | 179.33 | 174.1633 | 183.3917 | 175.947 | | 172.6513 | 6.678665 | 6.678665 | 6.678665 | 44.60457 | 3.724232 | 1 |
| 7 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 8 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 9 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 10 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 11 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 12 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 13 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 14 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 15 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 16 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 17 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| 18 | | 192.3567 | 177.0833 | 183.298 | 177.1253 | | | | | | | |
| CFE | | 36.42334 | 12.95335 | 31.63002 | 6.678665 | | | | | | | |
| MAD | | 15.23883 | 12.53888 | 15.94501 | 6.678665 | | | | | | | |
| MSE | | 294.4869 | 241.6343 | 406.3657 | 44.60457 | | | | | | | |
| MAPE | | 8.192239 | 6.695959 | 8.060199 | 3.724232 | | | | | | | |
| Trk.Signal | | 2.391421 | 1.036244 | 2 | 1 | | | | | | | |
| R-square | | 0.5843033 | 0.2208363 | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- *Single exponential smoothing*

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|-----------|----------|----------|-----------|--------------------|-----------|
| 1 | 166.06 | | | | | | | | |
| 2 | 164.78 | 166.06 | -1.279999 | -1.279999 | 1.279999 | 1.638397 | 0.7767926 | -1 | |
| 3 | 192.62 | 165.7272 | 26.89279 | 25.61279 | 14.0864 | 362.4303 | 7.369185 | 1.818264 | 0.8465427 |
| 4 | 161.81 | 172.7193 | -10.90933 | 14.70346 | 13.02737 | 281.2914 | 7.160145 | 1.128659 | 0.1785996 |
| 5 | 198.87 | 169.8829 | 28.98709 | 43.69055 | 17.0173 | 421.0314 | 9.014084 | 2.567419 | 0.4740587 |
| 6 | 179.33 | 177.4196 | 1.910446 | 45.601 | 13.99593 | 337.5551 | 7.424332 | 3.258161 | 0.4749183 |
| 7 | | 177.9163 | | | | | | | |
| 8 | | 177.9163 | | | | | | | |
| 9 | | 177.9163 | | | | | | | |
| 10 | | 177.9163 | | | | | | | |
| 11 | | 177.9163 | | | | | | | |
| 12 | | 177.9163 | | | | | | | |
| 13 | | 177.9163 | | | | | | | |
| 14 | | 177.9163 | | | | | | | |
| 15 | | 177.9163 | | | | | | | |
| 16 | | 177.9163 | | | | | | | |
| 17 | | 177.9163 | | | | | | | |
| 18 | | 177.9163 | | | | | | | |
| CFE | | 45.601 | | | | | | | |
| MAD | | 13.99593 | | | | | | | |
| MSE | | 337.5551 | | | | | | | |
| MAPE | | 7.424332 | | | | | | | |
| Trk.Signal | | 3.258161 | | | | | | | |
| R-square | | 0.4749183 | | | | | | | |
| | | Alpha=0.26 | | | | | | | |
| | | F(0)=166.06 | | | | | | | |

5. Peramalan pada Retailer Kordon

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|-----------|-----------|----------|----------|--------------------|-----------|
| 1 | 60.43 | | | | | | | | |
| 2 | 61.08 | 60.43 | 0.6500015 | 0.6500015 | 0.6500015 | 0.422502 | 1.064181 | 1 | |
| 3 | 58.67 | 60.755 | -2.085003 | -1.435001 | 1.367502 | 2.38487 | 2.30898 | -1.049359 | 0.3727291 |
| 4 | 64.08 | 60.06 | 4.020004 | 2.585003 | 2.25167 | 6.976725 | 3.630459 | 1.148038 | 0.1680682 |
| 5 | 63.66 | 61.065 | 2.595001 | 5.180004 | 2.337502 | 6.916051 | 3.74193 | 2.216042 | 0.3834284 |
| 6 | 58.93 | 61.584 | -2.653996 | 2.526009 | 2.400801 | 6.941579 | 3.894272 | 1.052152 | 0.1022189 |
| 7 | | 61.14166 | | | | | | | |
| 8 | | 61.14166 | | | | | | | |
| 9 | | 61.14166 | | | | | | | |
| 10 | | 61.14166 | | | | | | | |
| 11 | | 61.14166 | | | | | | | |
| 12 | | 61.14166 | | | | | | | |
| 13 | | 61.14166 | | | | | | | |
| 14 | | 61.14166 | | | | | | | |
| 15 | | 61.14166 | | | | | | | |
| 16 | | 61.14166 | | | | | | | |
| 17 | | 61.14166 | | | | | | | |
| 18 | | 61.14166 | | | | | | | |
| CFE | | 2.526009 | | | | | | | |
| MAD | | 2.400801 | | | | | | | |
| MSE | | 6.941579 | | | | | | | |
| MAPE | | 3.894272 | | | | | | | |
| Trk.Signal | | 1.052152 | | | | | | | |
| R-square | | 0.1022189 | | | | | | | |

• *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|-------------|------------------|------------------|------------------|------------------|----------------|-----------|----------|----------|----------|-----------------|----------|
| 1 | 60.43 | | | | | | | | | | | |
| 2 | 61.08 | | | | | | | | | | | |
| 3 | 58.67 | 60.755 | | | | | | | | | | |
| 4 | 64.08 | 59.875 | 60.06 | | | | | | | | | |
| 5 | 63.66 | 61.375 | 61.27666 | 61.065 | | | | | | | | |
| 6 | 58.93 | 63.87 | 62.13666 | 61.8725 | 61.584 | -2.653996 | -2.653996 | 2.653996 | 7.043692 | 4.503641 | -1 | |
| 7 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 8 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 9 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 10 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 11 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 12 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 13 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 14 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 15 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 16 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 17 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| 18 | | 61.295 | 62.22333 | 61.335 | 61.284 | | | | | | | |
| CFE | | -0.5350037 | 3.196682 | -0.347496 | -2.653996 | | | | | | | |
| MAD | | 3.378752 | 3.203335 | 2.768749 | 2.653996 | | | | | | | |
| MSE | | 12.91353 | 10.7078 | 7.696161 | 7.043692 | | | | | | | |
| MAPE | | 5.522026 | 5.152915 | 4.524776 | 4.503641 | | | | | | | |
| Trk.Signal | | -0.1583436 | 0.9979231 | -0.1255065 | -1 | | | | | | | |
| R-square | | 0.3444406 | 0.3413625 | 3.454227E-02 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

• *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|-------------|-------------------|-------------------|-------------------|-------------------|----------------|-----------|----------|----------|----------|-----------------|----------|
| 1 | 60.43 | | | | | | | | | | | |
| 2 | 61.08 | | | | | | | | | | | |
| 3 | 58.67 | 60.64667 | | | | | | | | | | |
| 4 | 64.08 | 60.27667 | 60.35333 | | | | | | | | | |
| 5 | 63.66 | 60.47333 | 60.77667 | 60.63889 | | | | | | | | |
| 6 | 58.93 | 63.94 | 61.305 | 61.215 | 60.95333 | -2.023331 | -2.023331 | 2.023331 | 4.093867 | 3.433448 | -1 | |
| 7 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 8 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 9 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 10 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 11 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 12 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 13 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 14 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 15 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 16 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 17 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| 18 | | 62.08333 | 63.08167 | 61.317 | 61.238 | | | | | | | |
| CFE | | 3.330231E-03 | 4.235001 | 0.7389957 | -2.023331 | | | | | | | |
| MAD | | 3.434168 | 2.994998 | 2.653494 | 2.023331 | | | | | | | |
| MSE | | 13.40689 | 9.280749 | 7.17682 | 4.093867 | | | | | | | |
| MAPE | | 5.70295 | 4.791704 | 4.312278 | 3.433448 | | | | | | | |
| Trk.Signal | | 9.530825E-04 | 1.414025 | 0.2777454 | -1 | | | | | | | |
| R-square | | 0.353212 | 0.3932883 | 3.915776E-02 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

• *Single exponential smoothing*

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|-------------|-----------------|----------------|-----------|-----------|----------|----------|-----------------|-----------|
| 1 | 60.43 | | | | | | | | |
| 2 | 61.08 | 60.43 | 0.6500015 | 0.6500015 | 0.6500015 | 0.422502 | 1.064181 | 1 | |
| 3 | 58.67 | 60.43 | -1.760002 | -1.110001 | 1.205002 | 1.760055 | 2.032007 | -0.9211609 | 0.2121343 |
| 4 | 64.08 | 60.43 | 3.650002 | 2.540001 | 2.020002 | 5.614207 | 3.253334 | 1.257425 | 0.1463741 |
| 5 | 63.66 | 60.43 | 3.23 | 5.77 | 2.322501 | 6.81888 | 3.708462 | 2.484391 | 0.4391679 |
| 6 | 58.93 | 60.43 | -1.5 | 4.27 | 2.158001 | 5.905104 | 3.475848 | 1.978683 | 0.1409105 |
| 7 | | 60.43 | | | | | | | |
| 8 | | 60.43 | | | | | | | |
| 9 | | 60.43 | | | | | | | |
| 10 | | 60.43 | | | | | | | |
| 11 | | 60.43 | | | | | | | |
| 12 | | 60.43 | | | | | | | |
| 13 | | 60.43 | | | | | | | |
| 14 | | 60.43 | | | | | | | |
| 15 | | 60.43 | | | | | | | |
| 16 | | 60.43 | | | | | | | |
| 17 | | 60.43 | | | | | | | |
| 18 | | 60.43 | | | | | | | |
| CFE | | | 4.27 | | | | | | |
| MAD | | | 2.158001 | | | | | | |
| MSE | | | 5.905104 | | | | | | |
| MAPE | | | 3.475848 | | | | | | |
| Trk.Signal | | | 1.978683 | | | | | | |
| R-square | | | 0.1409105 | | | | | | |
| | | Alpha=0 | | | | | | | |
| | | F(0)=60.43 | | | | | | | |

6. Peramalan pada Retailer Leuwipanjang

• *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|------------------|-------------|----------------|----------------|----------|----------|----------|----------|-----------------|----------|
| 1 | 118.74 | | | | | | | | |
| 2 | 133.79 | 118.74 | 15.05 | 15.05 | 15.05 | 226.5024 | 11.24897 | 1 | |
| 3 | 127 | 126.265 | 0.7350006 | 15.785 | 7.892498 | 113.5213 | 5.913855 | 2 | |
| 4 | 133.11 | 126.51 | 6.599998 | 22.38499 | 7.461665 | 90.20086 | 5.595338 | 3 | |
| 5 | 125.35 | 128.16 | -2.810005 | 19.57499 | 6.29875 | 69.62467 | 4.756936 | 3.107758 | |
| 6 | 142.33 | 127.598 | 14.732 | 34.30699 | 7.9854 | 99.10612 | 5.875668 | 4.296215 | |
| 7 | | 130.0533 | | | | | | | |
| 8 | | 130.0533 | | | | | | | |
| 9 | | 130.0533 | | | | | | | |
| 10 | | 130.0533 | | | | | | | |
| 11 | | 130.0533 | | | | | | | |
| 12 | | 130.0533 | | | | | | | |
| 13 | | 130.0533 | | | | | | | |
| 14 | | 130.0533 | | | | | | | |
| 15 | | 130.0533 | | | | | | | |
| 16 | | 130.0533 | | | | | | | |
| 17 | | 130.0533 | | | | | | | |
| 18 | | 130.0533 | | | | | | | |
| CFE | | 34.30699 | | | | | | | |
| MAD | | 7.9854 | | | | | | | |
| MSE | | 99.10612 | | | | | | | |
| MAPE | | 5.875668 | | | | | | | |
| Trk.Signal | | 4.296215 | | | | | | | |
| R-square | | | | | | | | | |

• *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|------------------|-------------|------------------|------------------|------------------|------------------|----------------|--------|--------|----------|----------|-----------------|----------|
| 1 | 118.74 | | | | | | | | | | | |
| 2 | 133.79 | | | | | | | | | | | |
| 3 | 127 | 126.265 | | | | | | | | | | |
| 4 | 133.11 | 130.395 | 126.51 | | | | | | | | | |
| 5 | 125.35 | 130.055 | 131.3 | 128.16 | | | | | | | | |
| 6 | 142.33 | 129.23 | 128.4867 | 129.8125 | 127.598 | 14.732 | 14.732 | 14.732 | 217.0319 | 10.3506 | 1 | |
| 7 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 8 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 9 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 10 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 11 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 12 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 13 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 14 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 15 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 16 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 17 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| 18 | | 133.84 | 133.5967 | 131.9475 | 132.316 | | | | | | | |
| CFE | | 11.84498 | 14.49333 | 9.707497 | 14.732 | | | | | | | |
| MAD | | 5.313749 | 8.79778 | 7.663754 | 14.732 | | | | | | | |
| MSE | | 90.41458 | 90.20018 | 82.29199 | 217.0319 | | | | | | | |
| MAPE | | 3.893965 | 6.477081 | 5.518216 | 10.3506 | | | | | | | |
| Trk.Signal | | 2.229119 | 1.647385 | 1.266677 | 1 | | | | | | | |
| R-square | | 0.2577846 | 0.5646974 | 0.3363135 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

• *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|------------------|-------------|-------------------|-------------------|-------------------|-------------------|----------------|----------|----------|----------|----------|-----------------|----------|
| 1 | 118.74 | | | | | | | | | | | |
| 2 | 133.79 | | | | | | | | | | | |
| 3 | 127 | 123.7567 | | | | | | | | | | |
| 4 | 133.11 | 131.5267 | 125.1333 | | | | | | | | | |
| 5 | 125.35 | 129.0367 | 131.4133 | 126.344 | | | | | | | | |
| 6 | 142.33 | 130.5233 | 128.7617 | 130.773 | 126.762 | 15.56801 | 15.56801 | 15.56801 | 242.3629 | 10.93797 | 1 | |
| 7 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 8 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 9 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 10 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 11 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 12 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 13 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 14 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 15 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 16 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 17 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| 18 | | 131.01 | 132.06 | 130.036 | 131.2873 | | | | | | | |
| CFE | | 12.94669 | 15.49168 | 10.56301 | 15.56801 | | | | | | | |
| MAD | | 5.080006 | 9.202782 | 6.275001 | 15.56801 | | | | | | | |
| MSE | | 41.90381 | 94.8304 | 67.27621 | 242.3629 | | | | | | | |
| MAPE | | 3.744922 | 6.78756 | 4.456421 | 10.93797 | | | | | | | |
| Trk.Signal | | 2.548557 | 1.682283 | 1.683214 | 1 | | | | | | | |
| R-square | | 0.438989 | 0.6903912 | 0.4550251 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | W(1)-2 | W(1)-3 | W(1)-4 | W(1)-5 | | | | | | | |
| | | W(2)-1 | W(2)-2 | W(2)-3 | W(2)-4 | | | | | | | |
| | | | W(3)-1 | W(3)-2 | W(3)-3 | | | | | | | |
| | | | | W(4)-1 | W(4)-2 | | | | | | | |
| | | | | | W(5)-1 | | | | | | | |

• Moving average

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 279.85 | | | | | | | | | | | |
| 2 | 314.83 | | | | | | | | | | | |
| 3 | 294.33 | 297.34 | | | | | | | | | | |
| 4 | 331.14 | 304.58 | 296.2367 | | | | | | | | | |
| 5 | 330.75 | 312.735 | 313.4333 | 305.0375 | | | | | | | | |
| 6 | 305.98 | 330.945 | 318.74 | 317.7625 | 310.18 | -4.199882 | -4.199882 | 4.199882 | 17.63985 | 1.372633 | -1 | |
| 7 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 8 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 9 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 10 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 11 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 12 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 13 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 14 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 15 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 16 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 17 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| 18 | | 318.365 | 322.6234 | 315.55 | 315.406 | | | | | | | |
| CFE | | 16.60004 | 39.35999 | 13.92999 | -4.199882 | | | | | | | |
| MAD | | 18.13751 | 21.62667 | 18.7475 | 4.199882 | | | | | | | |
| MSE | | 415.5717 | 557.9857 | 399.9798 | 17.63985 | | | | | | | |
| MAPE | | 5.662299 | 6.638647 | 5.912369 | 1.372633 | | | | | | | |
| Trk.Signal | | 0.9152323 | 1.819974 | 0.7438321 | -1 | | | | | | | |
| R-square | | 0.6855266 | | 0.580178 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

• Weighted moving average

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 279.85 | | | | | | | | | | | |
| 2 | 314.83 | | | | | | | | | | | |
| 3 | 294.33 | 291.51 | | | | | | | | | | |
| 4 | 331.14 | 307.3867 | 293.9233 | | | | | | | | | |
| 5 | 330.75 | 306.6 | 310.715 | 298.369 | | | | | | | | |
| 6 | 305.98 | 331.01 | 312.67 | 313.534 | 302.306 | 3.674011 | 3.674011 | 3.674011 | 13.49836 | 1.200736 | 1 | |
| 7 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 8 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 9 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 10 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 11 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 12 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 13 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 14 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 15 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 16 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 17 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| 18 | | 322.4933 | 326.8167 | 313.822 | 314.158 | | | | | | | |
| CFE | | 25.08331 | 50.56171 | 24.82703 | 3.674011 | | | | | | | |
| MAD | | 18.78583 | 21.3139 | 19.9675 | 3.674011 | | | | | | | |
| MSE | | 438.3224 | 610.4136 | 552.7963 | 13.49836 | | | | | | | |
| MAPE | | 5.857237 | 6.494276 | 6.129481 | 1.200736 | | | | | | | |
| Trk.Signal | | 1.335225 | 2.372241 | 1.243372 | 1 | | | | | | | |
| R-square | | 0.9390975 | | | | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

• Single exponential smoothing

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 279.85 | | | | | | | | |
| 2 | 314.83 | 279.85 | 34.97998 | 34.97998 | 34.97998 | 1223.599 | 11.11075 | 1 | |
| 3 | 294.33 | 300.4882 | -6.158203 | 28.82178 | 20.56909 | 630.7612 | 6.601515 | 1.401218 | |
| 4 | 331.14 | 296.8549 | 34.28516 | 63.10693 | 25.14111 | 812.3315 | 7.852234 | 2.510109 | |
| 5 | 330.75 | 317.0831 | 13.6669 | 76.77383 | 22.27256 | 655.9446 | 6.922199 | 3.447014 | |
| 6 | 305.98 | 325.1466 | -19.16656 | 57.60727 | 21.65136 | 598.2272 | 6.790558 | 2.660676 | |
| 7 | | 313.8383 | | | | | | | |
| 8 | | 313.8383 | | | | | | | |
| 9 | | 313.8383 | | | | | | | |
| 10 | | 313.8383 | | | | | | | |
| 11 | | 313.8383 | | | | | | | |
| 12 | | 313.8383 | | | | | | | |
| 13 | | 313.8383 | | | | | | | |
| 14 | | 313.8383 | | | | | | | |
| 15 | | 313.8383 | | | | | | | |
| 16 | | 313.8383 | | | | | | | |
| 17 | | 313.8383 | | | | | | | |
| 18 | | 313.8383 | | | | | | | |
| CFE | | 57.60727 | | | | | | | |
| MAD | | 21.65136 | | | | | | | |
| MSE | | 598.2272 | | | | | | | |
| MAPE | | 6.790558 | | | | | | | |
| Trk.Signal | | 2.660676 | | | | | | | |
| R-square | | | | | | | | | |
| | | Alpha=0.59 | | | | | | | |
| | | F(0)=279.85 | | | | | | | |

8. Peramalan pada Retailer Pagarsih

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 179.74 | | | | | | | | |
| 2 | 165.07 | 179.74 | -14.67 | -14.67 | 14.67 | 215.2088 | 8.887137 | -1 | |
| 3 | 167.91 | 172.405 | -4.494995 | -19.16499 | 9.582497 | 117.7069 | 5.782082 | -2 | |
| 4 | 156.82 | 170.9067 | -14.08665 | -33.25165 | 11.08388 | 144.6159 | 6.848951 | -3 | |
| 5 | 150.44 | 167.385 | -16.94499 | -50.19664 | 12.54916 | 180.2451 | 7.952619 | -4 | |
| 6 | 160.61 | 163.996 | -3.386002 | -53.58264 | 10.71653 | 146.4891 | 6.783737 | -5 | |
| 7 | | 163.4317 | | | | | | | |
| 8 | | 163.4317 | | | | | | | |
| 9 | | 163.4317 | | | | | | | |
| 10 | | 163.4317 | | | | | | | |
| 11 | | 163.4317 | | | | | | | |
| 12 | | 163.4317 | | | | | | | |
| 13 | | 163.4317 | | | | | | | |
| 14 | | 163.4317 | | | | | | | |
| 15 | | 163.4317 | | | | | | | |
| 16 | | 163.4317 | | | | | | | |
| 17 | | 163.4317 | | | | | | | |
| 18 | | 163.4317 | | | | | | | |
| CFE | | | -53.58264 | | | | | | |
| MAD | | | | 10.71653 | | | | | |
| MSE | | | | | 146.4891 | | | | |
| MAPE | | | | | | 6.783737 | | | |
| Trk. Signal | | | | -5 | | | | | |
| R-square | | | | | | | | | |

- *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 179.74 | | | | | | | | | | | |
| 2 | 165.07 | | | | | | | | | | | |
| 3 | 167.91 | 172.405 | | | | | | | | | | |
| 4 | 156.82 | 166.49 | 170.9067 | | | | | | | | | |
| 5 | 150.44 | 162.385 | 163.2667 | 167.385 | | | | | | | | |
| 6 | 160.61 | 153.63 | 158.39 | 160.06 | 163.996 | -3.386002 | -3.386002 | 3.386002 | 11.46501 | 2.108213 | -1 | |
| 7 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 8 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 9 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 10 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 11 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 12 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 13 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 14 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 15 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 16 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 17 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| 18 | | 155.525 | 155.9567 | 158.945 | 160.17 | | | | | | | |
| CFE | | -19.10995 | -24.69331 | -16.39499 | -3.386002 | | | | | | | |
| MAD | | 8.267494 | 9.711105 | 8.747498 | 3.386002 | | | | | | | |
| MSE | | 76.15996 | 122.6285 | 143.7176 | 11.46501 | | | | | | | |
| MAPE | | 5.279 | 6.297086 | 5.803024 | 2.108213 | | | | | | | |
| Trk. Signal | | -2.311457 | -2.542791 | -1.874249 | -1 | | | | | | | |
| R-square | | | | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 179.74 | | | | | | | | | | | |
| 2 | 165.07 | | | | | | | | | | | |
| 3 | 167.91 | 174.85 | | | | | | | | | | |
| 4 | 156.82 | 166.0167 | 172.8783 | | | | | | | | | |
| 5 | 150.44 | 164.2133 | 164.6417 | 170.681 | | | | | | | | |
| 6 | 160.61 | 154.6333 | 161.3017 | 162.809 | 168.4527 | -7.842667 | -7.842667 | 7.842667 | 61.50742 | 4.88305 | -1 | |
| 7 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 8 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 9 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 10 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 11 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 12 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 13 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 14 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 15 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 16 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 17 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| 18 | | 153.83 | 155.325 | 160.359 | 161.9294 | | | | | | | |
| CFE | | -23.99336 | -30.95168 | -22.44 | -7.842667 | | | | | | | |
| MAD | | 8.956659 | 10.31723 | 11.22 | 7.842667 | | | | | | | |
| MSE | | 89.36352 | 153.3454 | 207.2668 | 61.50742 | | | | | | | |
| MAPE | | 5.709221 | 6.703573 | 7.411845 | 4.88305 | | | | | | | |
| Trk. Signal | | -2.678827 | -3 | -2 | -1 | | | | | | | |
| R-square | | | | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- Moving average

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|----------|----------|--------------------|----------|
| 1 | 327.13 | | | | | | | | | | | |
| 2 | 344.03 | | | | | | | | | | | |
| 3 | 379.31 | 325.58 | | | | | | | | | | |
| 4 | 367.27 | 361.67 | 350.1566 | | | | | | | | | |
| 5 | 392.8 | 373.29 | 363.5367 | 354.435 | | | | | | | | |
| 6 | 351.21 | 380.035 | 379.7933 | 370.8525 | 362.108 | -10.89801 | -10.89801 | 10.89801 | 118.7666 | 3.10299 | -1 | |
| 7 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 8 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 9 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 10 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 11 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 12 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 13 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 14 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 15 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 16 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 17 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| 18 | | 372.005 | 370.4267 | 372.6475 | 366.924 | | | | | | | |
| CFE | | 40.01492 | 17.79333 | 18.7225 | -10.89801 | | | | | | | |
| MAD | | 24.41624 | 24.98667 | 29.00374 | 10.89801 | | | | | | | |
| MSE | | 788.7979 | 655.4056 | 928.8499 | 118.7666 | | | | | | | |
| MAPE | | 6.556996 | 6.749359 | 7.679529 | 3.10299 | | | | | | | |
| Trk.Signal | | 1.538865 | 0.712113 | 0.6485204 | -1 | | | | | | | |
| R-square | | | 0.6206782 | 0.3584766 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- Weighted moving average

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|------------|-----------|-----------|-----------|--------------------|----------|
| 1 | 327.13 | | | | | | | | | | | |
| 2 | 344.03 | | | | | | | | | | | |
| 3 | 379.31 | 332.7633 | | | | | | | | | | |
| 4 | 367.27 | 355.79 | 341.46 | | | | | | | | | |
| 5 | 392.8 | 375.2967 | 359.6633 | 346.65 | | | | | | | | |
| 6 | 351.21 | 375.78 | 377.545 | 364.139 | 351.8027 | -0.5926819 | -0.5926819 | 0.5926819 | 0.3512718 | 0.1687543 | -1 | |
| 7 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 8 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 9 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 10 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 11 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 12 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 13 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 14 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 15 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 16 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 17 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| 18 | | 378.9366 | 373.1033 | 375.586 | 365.0674 | | | | | | | |
| CFE | | 50.95996 | 33.61163 | 33.2098 | 0.5926819 | | | | | | | |
| MAD | | 25.02499 | 28.42723 | 29.53951 | 0.5926819 | | | | | | | |
| MSE | | 802.1083 | 819.2425 | 1148.491 | 0.3512718 | | | | | | | |
| MAPE | | 6.712255 | 7.65397 | 7.715129 | 0.1687543 | | | | | | | |
| Trk.Signal | | 2.036363 | 1.147197 | 1.124629 | -1 | | | | | | | |
| R-square | | | | 0.8148887 | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- Single exponential smoothing

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|----------|----------|----------|----------|--------------------|----------|
| 1 | 327.13 | | | | | | | | |
| 2 | 344.03 | 327.13 | 16.89999 | 16.89999 | 16.89999 | 285.6098 | 4.912361 | 1 | |
| 3 | 379.31 | 339.129 | 40.181 | 57.08099 | 28.5405 | 950.0613 | 7.752771 | 2 | |
| 4 | 367.27 | 367.6575 | -0.3875122 | 56.69348 | 19.15617 | 633.4243 | 5.203685 | 2.959542 | |
| 5 | 392.8 | 367.3824 | 25.41763 | 82.11111 | 20.72153 | 636.5822 | 5.520485 | 3.962598 | |
| 6 | 351.21 | 385.4289 | -34.21887 | 47.89224 | 23.421 | 743.452 | 6.365016 | 2.044842 | |
| 7 | | 361.1335 | | | | | | | |
| 8 | | 361.1335 | | | | | | | |
| 9 | | 361.1335 | | | | | | | |
| 10 | | 361.1335 | | | | | | | |
| 11 | | 361.1335 | | | | | | | |
| 12 | | 361.1335 | | | | | | | |
| 13 | | 361.1335 | | | | | | | |
| 14 | | 361.1335 | | | | | | | |
| 15 | | 361.1335 | | | | | | | |
| 16 | | 361.1335 | | | | | | | |
| 17 | | 361.1335 | | | | | | | |
| 18 | | 361.1335 | | | | | | | |
| CFE | | | 47.89224 | | | | | | |
| MAD | | | 23.421 | | | | | | |
| MSE | | | 743.452 | | | | | | |
| MAPE | | | 6.365016 | | | | | | |
| Trk.Signal | | | 2.044842 | | | | | | |
| R-square | | | | | | | | | |
| | | Alpha=0.71 | | | | | | | |
| | | F(0)=327.13 | | | | | | | |

10. Peramalan pada Retailer Singosari

- *Simple average*

| 07-13-2010 Month | Actual Data | Forecast by SA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|-------------------|-------------------|-----------|----------|----------|----------|--------------------|--------------|
| 1 | 133.5 | | | | | | | | |
| 2 | 151.17 | 133.5 | 17.67 | 17.67 | 17.67 | 312.2288 | 11.68883 | 1 | |
| 3 | 152.33 | 142.335 | 9.99501 | 27.66501 | 13.8325 | 206.0645 | 9.125122 | 2 | |
| 4 | 111.17 | 145.6667 | -34.49667 | -6.831665 | 20.72056 | 534.0499 | 16.42694 | -0.3297046 | 8.613493E-02 |
| 5 | 131.67 | 137.0425 | -5.372498 | -12.20416 | 16.88354 | 407.7533 | 13.34027 | -0.7228436 | 0.1107855 |
| 6 | 127.5 | 135.968 | -8.467987 | -20.67215 | 15.20043 | 340.544 | 12.00053 | -1.359971 | 0.1539703 |
| 7 | | 134.5567 | | | | | | | |
| 8 | | 134.5567 | | | | | | | |
| 9 | | 134.5567 | | | | | | | |
| 10 | | 134.5567 | | | | | | | |
| 11 | | 134.5567 | | | | | | | |
| 12 | | 134.5567 | | | | | | | |
| 13 | | 134.5567 | | | | | | | |
| 14 | | 134.5567 | | | | | | | |
| 15 | | 134.5567 | | | | | | | |
| 16 | | 134.5567 | | | | | | | |
| 17 | | 134.5567 | | | | | | | |
| 18 | | 134.5567 | | | | | | | |
| CFE | | -20.67215 | | | | | | | |
| MAD | | 15.20043 | | | | | | | |
| MSE | | 340.544 | | | | | | | |
| MAPE | | 12.00053 | | | | | | | |
| Trk.Signal | | -1.359971 | | | | | | | |
| R-square | | 0.1539703 | | | | | | | |

- *Moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-MA | Forecast by 3-MA | Forecast by 4-MA | Forecast by 5-MA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|---------------------|---------------------|---------------------|---------------------|-------------------|-----------|----------|---------|----------|--------------------|----------|
| 1 | 133.5 | | | | | | | | | | | |
| 2 | 151.17 | | | | | | | | | | | |
| 3 | 152.33 | 142.335 | | | | | | | | | | |
| 4 | 111.17 | 151.75 | 145.6667 | | | | | | | | | |
| 5 | 131.67 | 131.75 | 138.2233 | 137.0425 | | | | | | | | |
| 6 | 127.5 | 121.42 | 131.7233 | 136.5985 | 135.968 | -8.467987 | -8.467987 | 8.467987 | 71.7068 | 6.641559 | -1 | |
| 7 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 8 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 9 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 10 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 11 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 12 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 13 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 14 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 15 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 16 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 17 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| 18 | | 129.585 | 123.4467 | 130.6675 | 134.768 | | | | | | | |
| CFE | | -24.58499 | -45.27333 | -14.45749 | -8.467987 | | | | | | | |
| MAD | | 14.18375 | 15.09111 | 7.228745 | 8.467987 | | | | | | | |
| MSE | | 445.9024 | 416.9344 | 55.7084 | 71.7068 | | | | | | | |
| MAPE | | 11.97337 | 13.10659 | 5.602879 | 6.641559 | | | | | | | |
| Trk.Signal | | -1.73332 | -3 | -2 | -1 | | | | | | | |
| R-square | | 0.7755093 | | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |

- *Weighted moving average*

| 07-13-2010 Month | Actual Data | Forecast by 2-WMA | Forecast by 3-WMA | Forecast by 4-WMA | Forecast by 5-WMA | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|----------------------|----------------------|----------------------|----------------------|-------------------|-----------|----------|---------|----------|--------------------|----------|
| 1 | 133.5 | | | | | | | | | | | |
| 2 | 151.17 | | | | | | | | | | | |
| 3 | 152.33 | 139.39 | | | | | | | | | | |
| 4 | 111.17 | 151.5967 | 142.5283 | | | | | | | | | |
| 5 | 131.67 | 138.61 | 144.89 | 140.334 | | | | | | | | |
| 6 | 127.5 | 118.0033 | 135.1667 | 141.569 | 138.8787 | -11.37866 | -11.37866 | 11.37866 | 129.474 | 8.924441 | -1 | |
| 7 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 8 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 9 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 10 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 11 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 12 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 13 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 14 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 15 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 16 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 17 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| 18 | | 130.28 | 120.725 | 133.367 | 139.3013 | | | | | | | |
| CFE | | -24.88999 | -52.245 | -22.73203 | -11.37866 | | | | | | | |
| MAD | | 17.44083 | 17.415 | 11.36601 | 11.37866 | | | | | | | |
| MSE | | 484.219 | 405.6385 | 136.487 | 125.474 | | | | | | | |
| MAPE | | 14.38564 | 14.75362 | 8.806316 | 8.924441 | | | | | | | |
| Trk.Signal | | -1.42711 | -3 | -2 | -1 | | | | | | | |
| R-square | | 0.8552496 | | | | | | | | | | |
| | | m=2 | m=3 | m=4 | m=5 | | | | | | | |
| | | w(1)=2 | w(1)=3 | w(1)=4 | w(1)=5 | | | | | | | |
| | | w(2)=1 | w(2)=2 | w(2)=3 | w(2)=4 | | | | | | | |
| | | | w(3)=1 | w(3)=2 | w(3)=3 | | | | | | | |
| | | | | w(4)=1 | w(4)=2 | | | | | | | |
| | | | | | w(5)=1 | | | | | | | |

- *Single exponential smoothing*

| 07-13-2010 Month | Actual Data | Forecast by SES | Forecast Error | CFE | MAD | MSE | MAPE (%) | Tracking Signal | R-square |
|---------------------|----------------|--------------------|-------------------|----------|--------|----------|----------|--------------------|--------------|
| 1 | 133.5 | | | | | | | | |
| 2 | 151.17 | 133.5 | 17.67 | 17.67 | 17.67 | 312.2288 | 11.68883 | 1 | |
| 3 | 152.33 | 133.5 | 18.83 | 36.5 | 18.25 | 333.3989 | 12.02507 | 2 | |
| 4 | 111.17 | 133.5 | -22.33 | 14.17 | 19.61 | 388.4756 | 14.71217 | 0.7225904 | 6.092821E-02 |
| 5 | 131.67 | 133.5 | -1.830002 | 12.34 | 15.165 | 292.1939 | 11.38159 | 0.8137155 | 3.366804E-02 |
| 6 | 127.5 | 133.5 | -6 | 6.339996 | 13.332 | 240.9551 | 10.04645 | 0.4755473 | 6.71743E-03 |
| 7 | | 133.5 | | | | | | | |
| 8 | | 133.5 | | | | | | | |
| 9 | | 133.5 | | | | | | | |
| 10 | | 133.5 | | | | | | | |
| 11 | | 133.5 | | | | | | | |
| 12 | | 133.5 | | | | | | | |
| 13 | | 133.5 | | | | | | | |
| 14 | | 133.5 | | | | | | | |
| 15 | | 133.5 | | | | | | | |
| 16 | | 133.5 | | | | | | | |
| 17 | | 133.5 | | | | | | | |
| 18 | | 133.5 | | | | | | | |
| CFE | | 6.339996 | | | | | | | |
| MAD | | 13.332 | | | | | | | |
| MSE | | 240.9551 | | | | | | | |
| MAPE | | 10.04645 | | | | | | | |
| Trk.Signal | | 0.4755473 | | | | | | | |
| R-square | | 6.71743E-03 | | | | | | | |
| | | Alpha=0 | | | | | | | |
| | | F(0)=133.5 | | | | | | | |

PENGENDALIAN PERSEDIAAN PERUSAHAAN SAAT INI

Pengendalian Persediaan Saat Ini Pada Eselon *Supplier*

Pengendalian persediaan pada *supplier* saat ini menyerupai metode *Economic Production Quantity* (EPQ). Di mana, produksi dilakukan saat persediaan telah mencapai *reorder point*. Jumlah produk yang diproduksi oleh *supplier* adalah sebanyak jumlah produksi optimum, yaitu sebesar Q. Metode pendekatan EPQ ini digunakan karena jumlah persentase produk yang diproduksi *supplier* khusus untuk Yomart tidak diketahui. Tabel C.1 memperlihatkan data pada *supplier* yang dibutuhkan untuk perhitungan jumlah produksi optimum.

Tabel C.1
Data *Supplier*

| Notasi | Keterangan | Jumlah |
|--------|----------------------------|--------------------------|
| R | Permintaan / tahun | 19635,9948 unit/tahun |
| K | Kapasitas Produksi / tahun | 7592000 unit |
| N | Hari kerja | 300 hari/tahun |
| H | Biaya Simpan | Rp 123 /unit/tahun |
| L | <i>Lead Time</i> | 1 hari = 0,0033 tahun |
| C | Biaya <i>Set up</i> | Rp 10.146/ <i>set up</i> |

Langkah pertama adalah menghitung rata-rata produksi dan permintaan per hari.

$$p = \frac{K}{N} = \frac{7592000}{300} = 25306,6667 \text{ unit/hari}$$

$$r = \frac{R}{N} = \frac{19635,9948}{300} = 65,4533 \text{ unit/hari}$$

Di mana:

R = jumlah permintaan produk ramalan 10 *Retailer* Yomart dari periode Juli 2009-Juni 2010.

p = rata-rata produksi per hari

r = rata-rata permintaan per hari

Langkah berikutnya, menghitung reorder point dan kuantitas produksi optimum.

$$Q^* = \sqrt{\frac{2CRp}{H(p-r)}} = \sqrt{\frac{2*10146*19635,9948*25306,667}{123(25306,6667-65,4533)}} = 1802,1821 \text{ unit/siklus}$$

$$B = \frac{RL}{N} = \frac{19635,9948*0.0033}{300} = 0,2162 \text{ unit}$$

Di mana:

B = *reorder point*

Q* = jumlah produksi optimal

Langkah terakhir adalah menghitung biaya pengendalian persediaan pada *supplier* yang meliputi biaya simpan dan biaya *set up*.

$$\text{Biaya simpan} = \frac{HQ*(p-r)}{p} = \frac{123*1802,1821*(25306,6667-65,4533)}{25306,6667} = \text{Rp } 221.095/\text{tahun}$$

$$\text{Biaya set up} = \frac{CR}{Q^*} = \frac{10146*19635,9948}{1802,1821} = \text{Rp } 110.548/\text{tahun}$$

Dengan demikian total biaya pengendalian persediaan pada *supplier* adalah:

$$\begin{aligned} \text{Biaya total} &= \text{biaya simpan} + \text{biaya set up} \\ &= \text{Rp } 221.095 + \text{Rp } 110.548 \\ &= \text{Rp } 331.643 / \text{tahun} \end{aligned}$$

Pengendalian Persediaan Saat Ini Pada Eselon *Distribution Center*

Pengendalian persediaan pada DC adalah dengan menggunakan metode P(t,E) atau yang biasa disebut dengan metode periodik. Pemesanan dilakukan di saat waktu review yang ditetapkan oleh perusahaan, yaitu setiap 3 hari sekali ($t = 0,01$ tahun). *Lead time* pengiriman adalah 1 hari. Jumlah produk yang dipesan setiap waktu review yaitu sebesar batas persediaan maksimum (E) dikurangi dengan jumlah persediaan yang tersisa saat itu. Tabel C.2 memperlihatkan data pada DC yang didapatkan dari perusahaan.

Tabel C.2
Data *Distribution Center*

| Keterangan | Notasi | Jumlah |
|---------------------------|--------------------|-----------------------|
| Permintaan / tahun | R | 19635,9948 unit/tahun |
| Standar deviasi | σ | 164,4659 unit/tahun |
| Biaya pesan | C_{pesan} | Rp 3.689/pesan |
| Biaya transportasi | c_{trans} | Rp 23,71 /unit/pesan |
| Biaya Simpan | H | Rp 128/unit/tahun |
| <i>Lead time</i> | L | 1 hari = 0,0033 tahun |
| Periode pemesanan | t | 3 hari = 0,01 tahun |
| Biaya <i>stockout</i> | π | Rp 2.000,00/unit |
| <i>Safety stock</i> | SS | 83,8667 unit |
| Batas maksimum persediaan | E | 236,5467unit |

Langkah pertama sebelum menghitung biaya pengendalian persediaan pada DC adalah menghitung probabilitas terjadinya *stockout* untuk kasus *lost sales*.

$$F'(k) = \frac{Ht}{Ht+\pi} = \frac{128*0,01}{128*0,01+2000} = 0,0006$$

Di mana:

$F(k)$ = probabilitas terjadinya *stockout* (*lost sales case*)

Kemudian dari probabilitas $F(k)$ tentukan *safety factor* (k) dan *partial expectation* (E(k)) dari tabel normal. Dari tabel normal pada Lampiran E didapatkan $k = 3$ dan $E(k) = 0,0004$.

Langkah selanjutnya adalah menentukan permintaan selama *lead time*, permintaan selama periode *lead time* dan periode pemesanan, standar deviasi selama periode *lead time* dan periode pemesanan, juga jumlah *lost sales* selama *lead time* dan periode pemesanan.

$$\begin{aligned}\mu_L &= R \cdot L \\ &= 19635,9948 \cdot 0,0033 \\ &= 64,7988 \text{ unit}\end{aligned}$$

$$\begin{aligned}\mu_{L+t} &= R \cdot (L+t) \\ &= 19635,9948 \cdot (0,0033+0,01) \\ &= 261,1587 \text{ unit}\end{aligned}$$

$$\begin{aligned}\sigma_{L+t} &= \sigma \sqrt{L+t} \\ &= 164,4659 \sqrt{0,0033+0,01} \\ &= 18,9909 \text{ unit}\end{aligned}$$

$$\begin{aligned}Nk &= \sigma_{L+t} \cdot E(k) \\ &= 18,9909 \cdot 0,0004 \\ &= 0,0076 \text{ unit/siklus}\end{aligned}$$

Di mana:

μ_L = permintaan saat *lead time*

μ_{L+t} = permintaan saat *lead time* dan periode pemesanan

σ_{L+t} = standar deviasi permintaan selama *lead time* dan periode pemesanan

Nk = Jumlah *lost sales* selama *lead time* dan periode pemesanan

Pengendalian Persediaan Saat Ini Pada Eselon *Retailer*

Pada *retailer*, pengendalian persediaan sama seperti DC yaitu dengan menggunakan pendekatan metode periodik. Pemesanan dilakukan sebesar batas maksimum persediaan dikurangi dengan persediaan saat itu. Pemesanan dan waktu *review* dilakukan setiap 2 hari sekali ($t = 0,0133$ semester). *Lead time* sebesar 1 hari ($L = 0,0067$ semester), sedangkan data lainnya yang ditentukan oleh perusahaan dapat dilihat pada Tabel C.3 di berikut ini:

Tabel C.3
Data Distribution Center

| Retailer | R (unit/tahun) | σ (unit/tahun) | C _{pesan} (Rp/pesan) | C _{trans} (Rp/unit/kirim) | H (Rp/unit/semester) | (tahun) | t (tahun) | μ (Rp/unit) | SS (unit) | E (unit) |
|--------------|-------------------|--------------------------|----------------------------------|---------------------------------------|-------------------------|---------|--------------|--------------------|--------------|----------|
| Batujajar | 443,6400 | 3,5031 | 293 | 17,73 | 160 | 0,0033 | 0,0067 | 2.350 | 4,4800 | 10,9600 |
| Cicadas | 1173,0000 | 7,0327 | 293 | 5,86 | 160 | 0,0033 | 0,0067 | 2.150 | 4,6667 | 18,0000 |
| Cihanjuang | 1917,8400 | 17,8918 | 293 | 14,53 | 160 | 0,0033 | 0,0067 | 2.250 | 9,6533 | 26,1333 |
| Kopo 373 | 2153,7840 | 22,1572 | 293 | 12,26 | 160 | 0,0033 | 0,0067 | 2.250 | 7,4800 | 22,1333 |
| Kordon | 734,8560 | 3,2551 | 293 | 8,43 | 160 | 0,0033 | 0,0067 | 2.200 | 6,3200 | 22,9600 |
| Lewipanjang | 1572,1200 | 11,5503 | 293 | 9,06 | 160 | 0,0033 | 0,0067 | 2.200 | 11,3067 | 25,9600 |
| M.Ramdan | 3769,8960 | 28,7724 | 293 | 6,48 | 160 | 0,0033 | 0,0067 | 2.200 | 11,6533 | 32,1333 |
| Pagarsih | 1922,0400 | 14,2719 | 293 | 9,06 | 160 | 0,0033 | 0,0067 | 2.200 | 9,6533 | 28,1333 |
| Sarimanah | 4380,8088 | 34,1382 | 293 | 11,64 | 160 | 0,0033 | 0,0067 | 2.250 | 11,6533 | 32,1333 |
| Singosari | 1568,0100 | 21,8930 | 293 | 9,68 | 160 | 0,0033 | 0,0067 | 2.250 | 7,0000 | 18,0000 |
| Total | 19635,9948 | 164,4659 | | | | | | | 83,8667 | 236,5467 |

Di mana:

R = Permintaan per tahun

σ = Standar deviasi permintaan

C_{pesan} = Ongkos pesan

c_{trans} = Ongkos transportasi

H = Ongkos simpan

L = Lead time

t = Periode pemesanan

μ = Ongkos *stockout*

SS = *Safety stock*

E = Batas maksimum persediaan

Keterangan :

Untuk perhitungan *safety stock* diperoleh dari data perusahaan dapat dilihat pada tabel C.4

Tabel C.4
Safety Stock Retailer

| Retailer | <i>Safety Stock</i> | | |
|-------------|---------------------|-------|-------|
| | 1500ml | 620ml | 250ml |
| Batujajar | 2 | 6 | 0 |
| Cicadas | 3 | 0 | 10 |
| Cihanjuang | 6 | 4 | 12 |
| Kopo 373 | 3 | 6 | 12 |
| Kordon | 3 | 4 | 10 |
| Lewipanjang | 4 | 8 | 24 |
| M.Ramdan | 6 | 4 | 24 |
| Pagarsih | 6 | 4 | 12 |
| Sarimanah | 6 | 4 | 24 |
| Singosari | 3 | 0 | 24 |

Tabel C.5
Safety Stock Agregat

| Retailer | Safety Stock | | | Jumlah SS |
|-------------|--------------|-------|-------|-----------|
| | 1500ml | 620ml | 250ml | |
| Batujajar | 2 | 2,48 | 0 | 4,48 |
| Cicadas | 3 | 0 | 1,6 | 4,66 |
| Cihanjuang | 6 | 1,65 | 2 | 9,65 |
| Kopo 373 | 3 | 2,48 | 2 | 7,48 |
| Kordon | 3 | 1,65 | 1,6 | 6,32 |
| Lewipanjang | 4 | 3,30 | 4 | 11,30 |
| M.Ramdan | 6 | 1,65 | 4 | 11,65 |
| Pagarsih | 6 | 1,65 | 2 | 9,65 |
| Sarimanah | 6 | 1,65 | 4 | 11,65 |
| Singosari | 3 | 0 | 4 | 7,00 |

Contoh perhitungan pada Retailer Batujajar kemasan 620ml:

$$\begin{aligned} \text{Safety stock agregat} &= \frac{620\text{ml}}{1500\text{ml}} * \text{safety stock} \\ &= \frac{620\text{ml}}{1500\text{ml}} * 6 = 2,48 \end{aligned}$$

Kemudian dilakukan perhitungan jumlah unit *stockout* selama periode pemesanan dan *lead time* yang dapat dilihat pada tabel C.6.

Tabel C.6
Perhitungan *Stockout* Retailer Saat Ini

| Retailer | Q (unit) | F'(k) | k | μ_{L+t} (unit) | σ_{L+t} (unit) | μ_L (unit) | σ_L (unit) | E(k) | Nk (unit/siklus) |
|-------------|----------|--------|---|--------------------|-----------------------|----------------|-------------------|--------|------------------|
| Batujajar | 40,3092 | 0,0005 | 3 | 4,436 | 0,3503 | 1,4788 | 0,2022 | 0,0004 | 0,00014 |
| Cicadas | 65,5447 | 0,0005 | 3 | 11,730 | 0,7033 | 3,9100 | 0,4060 | 0,0004 | 0,00028 |
| Cihanjuang | 83,8098 | 0,0005 | 3 | 19,178 | 1,7892 | 6,3928 | 1,0330 | 0,0004 | 0,00072 |
| Kopo 373 | 88,8157 | 0,0005 | 3 | 21,538 | 2,2157 | 7,1793 | 1,2792 | 0,0004 | 0,00089 |
| Kordon | 51,8788 | 0,0005 | 3 | 7,349 | 0,3255 | 2,4495 | 0,1879 | 0,0004 | 0,00013 |
| Lewipanjang | 75,8808 | 0,0005 | 3 | 15,721 | 1,1550 | 5,2404 | 0,6669 | 0,0004 | 0,00046 |
| M.Ramdan | 117,5042 | 0,0005 | 3 | 37,699 | 2,8772 | 12,5663 | 1,6612 | 0,0004 | 0,00115 |
| Pagarsih | 83,9016 | 0,0005 | 3 | 19,220 | 1,4272 | 6,4068 | 0,8240 | 0,0004 | 0,00057 |
| Sarimanah | 126,6677 | 0,0005 | 3 | 43,808 | 3,4138 | 14,6027 | 1,9710 | 0,0004 | 0,00137 |
| Singosari | 75,7815 | 0,0005 | 3 | 15,680 | 2,1893 | 5,2267 | 1,2640 | 0,0004 | 0,00088 |

Di mana:

Q = Jumlah pemesanan optimal

F'(k) = Probabilitas terjadinya *stockout* (*lost sales case*)

k = *Safety factor*

μ_{L+t} = Permintaan selama *lead time* dan periode pemesanan

σ_{L+t} = Standar deviasi selama *lead time* dan periode pemesanan

μ_L = Permintaan selama *lead time*

σ_L = Standar deviasi selama *lead time*

E(k) = *Partial expectation*

SS = *Safety stock*

E = Batas maksimum persediaan

Contoh perhitungan *stockout* pada retailer Batujajar:

$$\begin{aligned} F'(k) &= \frac{Ht}{Ht+\pi} \\ &= \frac{160*0,0067}{160*0,0067+2350} \\ &= 0,0005 \end{aligned}$$

k dan $E(k) \rightarrow$ tabel distribusi normal, $k = 3$, $E(k)=0,0004$.

$$\begin{aligned} \mu_L &= R*L \\ &= 40,3092*0,0033 \\ &= 1,4788 \text{ unit} \end{aligned}$$

$$\begin{aligned} \mu_{L+t} &= R*(L+t) \\ &= 40,3092*(0,0033+0,0067) \\ &= 4,436 \text{ unit} \end{aligned}$$

$$\begin{aligned} \sigma_{L+t} &= \sigma\sqrt{L+t} \\ &= 3,5031\sqrt{0,0033+0,0067} \\ &= 0,2022 \text{ unit} \end{aligned}$$

$$\begin{aligned} Nk &= \sigma_{L+t}*E(k) \\ &= 0,2022*0,0004 \\ &= 0,00014 \text{ unit} \end{aligned}$$

Hasil perhitungan biaya-biaya yang dikeluarkan *Retailer* untuk saat ini dapat dilihat pada Tabel C.7 di bawah ini.

Tabel C.7
Total Biaya pada *Retailer*

| <i>Retailer</i> | Biaya simpan (Rp/tahun) | Biaya <i>Stockout</i> (Rp/tahun) | Biaya Pesan (Rp/tahun) | Biaya transportasi (Rp/tahun) |
|-----------------|-------------------------|----------------------------------|------------------------|-------------------------------|
| Batujajar | 1.280 | 49 | 43.950 | 7.865 |
| Cicadas | 1.629 | 91 | 43.950 | 6.870 |
| Cihanjuang | 2.136 | 242 | 43.950 | 27.857 |
| Kopo 373 | 1.244 | 299 | 43.950 | 26.407 |
| Kordon | 2.890 | 43 | 43.950 | 6.198 |
| Lewipanjang | 2.477 | 152 | 43.950 | 14.241 |
| M.Ramdan | 1.120 | 380 | 43.950 | 24.435 |
| Pagarsih | 2.451 | 188 | 43.950 | 17.411 |
| Sarimanah | 469 | 461 | 43.950 | 50.974 |
| Singosari | 1.208 | 296 | 43.950 | 15.184 |
| Total | 16.903 | 2.201 | 439.500 | 197.442 |

Contoh perhitungan biaya-biaya pada Retailer Batuजार:

$$\begin{aligned}\text{Biaya simpan} &= H * \left(E - \mu_L - R * \frac{t}{2} + Nk \right) \\ &= 160 * \left(10,96 - 1,4788 - 40,3092 * \frac{0,0067}{2} + 0,00014 \right) \\ &= \text{Rp } 1.280/\text{tahun}\end{aligned}$$

$$\begin{aligned}\text{Biaya } \textit{stockout} &= \frac{H}{t} * Nk \\ &= \frac{2350}{0,0067} * 0.00014 \\ &= \text{Rp } 49/\text{tahun}\end{aligned}$$

$$\begin{aligned}\text{Biaya pesan} &= \frac{C_{\text{pesan}}}{t} \\ &= \frac{293}{0,0067} \\ &= \text{Rp } 42.950/\text{tahun}\end{aligned}$$

$$\begin{aligned}\text{Biaya transportasi} &= R * c_{\text{trans}} \\ &= 40,3092 * 17,73 \\ &= \text{Rp } 7.865 /\text{tahun}\end{aligned}$$

PENGENDALIAN PERSEDIAAN USULAN DENGAN METODE *MULTI ESELON*

Tabel D.1
Data *Retailer*

| No. | <i>RETAILER</i> | Biaya Pesan (Rp/Pesan) Aj | Biaya Simpan (Rp/unit/tahun) Hj | Biaya Kekurangan (Rp/unit) Bj | Demand (tahun) Dj | Safety stock (unit) SSj | Lead time (tahun) Ldj | Biaya Transportasi (Rp/Pesan) | Mj |
|-----------|-----------------|---------------------------|---------------------------------|-------------------------------|-------------------|-------------------------|-----------------------|-------------------------------|-------------|
| 1 | BATUJAJAR | 293 | 160 | 2.350 | 443,64 | 4,48 | 0,0033 | 17,73 | 0,000225129 |
| 2 | CICADAS | 293 | 160 | 2.150 | 1.173 | 4,67 | 0,0033 | 5,86 | 0,000297364 |
| 3 | CIHANJUANG | 293 | 160 | 2.250 | 1.917,84 | 9,65 | 0,0033 | 14,53 | 0,00057712 |
| 4 | KOPO 373 | 293 | 160 | 2.250 | 2.153,784 | 7,48 | 0,0033 | 12,26 | 0,000657881 |
| 5 | KORDON | 293 | 160 | 2.200 | 734,856 | 6,32 | 0,0033 | 8,43 | 0,000181625 |
| 6 | LEWIPANJANG | 293 | 160 | 2.200 | 1.572,12 | 11,3 | 0,0033 | 9,06 | 0,000308 |
| 7 | M.RAMDAN | 293 | 160 | 2.200 | 3.769,896 | 11,65 | 0,0033 | 6,48 | 0,000571305 |
| 8 | PAGARSIH | 293 | 160 | 2.200 | 1.922,04 | 9,65 | 0,0033 | 9,06 | 0,000378542 |
| 9 | SARIMANAH | 293 | 160 | 2.250 | 4.380,8088 | 11,65 | 0,0033 | 11,64 | 0,000724882 |
| 10 | SINGOSARI | 293 | 160 | 2.250 | 1.568,01 | 7 | 0,0033 | 9,68 | 0,000700977 |
| Do | | | | | 19.635,9948 | | | | |

Tabel D.2
Data *Distribution Center (DC)*

| Jenis | Notasi | Jumlah |
|--------------------------------------|----------|----------|
| Pemesanan DC ke <i>supplier</i> | A_d | Rp3.689 |
| Biaya Simpan DC | H_d | Rp128 |
| Lead time DC ke unit <i>supplier</i> | L_{od} | 0,003333 |

Tabel D.3
Data Produksi

| Jenis | Notasi | Jumlah |
|---|----------|----------------|
| Kapasitas Produksi | K | 7.592.000 unit |
| Biaya Simpan unit <i>supplier</i> | H_o | Rp123 |
| Biaya <i>setup</i> | A_o | Rp10.146 |
| Biaya Transportasi dari <i>supplier</i> ke DC | C_{od} | Rp23,71 |

Langkah 1 Perhitungan Frekuensi Pemesanan dari DC ke *Supplier* (N_{od})

$$\text{Rumus : } N_{od}(N_{od}+1) \geq \frac{A_o(H_d+2H_oD_o/K)}{A_dH_o(1-D_o/K)}$$

$$N_{od}(N_{od}+1) \geq \frac{Rp10.146(Rp128+2*Rp123*19635,99/7.592.000)}{Rp3689*123(1-19635,99/7.592.000)}$$

$$N_{od}(N_{od}+1) \geq \frac{1305143,452}{452573,426}$$

$$N_{od}(N_{od}+1) \geq 2,88$$

$$N_{od}^2 + N_{od} - 2,88 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-2,88)}}{2*1}$$

$$= \frac{-1 \pm 3,54}{2}$$

$$= \frac{-1 + 3,54}{2}$$

$$N_{od} = 1,27 \approx 2 \text{ kali/tahun}$$

$$= \frac{-1 - 3,54}{2}$$

$$= -2,27 \text{ (tidak memenuhi)}$$

Langkah 2 Perhitungan Frekuensi Pemesanan dari *Retailer j* ke DC (N_{dj})

Frekuensi Pemesanan Pada *Retailer 1*

$$\text{Rumus} = N_{d1}(N_{d1}+1) \geq \frac{A_d H_1 D_1}{D_o (H_d + 2H_o D_o / K) (A_1 + M_1 B_2)}$$

$$N_{d1}(N_{d1}+1) \geq \frac{3689*160*443,64}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000225*2350))}$$

$$N_{d1}(N_{d1}+1) \geq \frac{261854073,6}{741425282,42}$$

$$N_{d1}(N_{d1}+1) \geq 0,353$$

$$N_{d1}^2 + N_{d1} - 0,353 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-0,353)}}{2*1}$$

$$= \frac{-1 \pm 1,55}{2}$$

$$= \frac{-1 + 1,55}{2}$$

$$N_{d1} = 0,276 \approx 1 \text{ kali/tahun}$$

$$= \frac{-1 - 1,55}{2}$$

$$= -1,276 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 2

$$N_{d2}(N_{d2}+1) \geq \frac{A_d H_2 D_2}{D_o(H_d+2H_o D_o/K)(A_2+M_2 B_2)}$$

$$N_{d2}(N_{d2}+1) \geq \frac{3689*160*1173}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000297*2150))}$$

$$N_{d2}(N_{d2}+1) \geq \frac{692351520}{741703838,22}$$

$$N_{d2}(N_{d2}+1) \geq 0,933$$

$$N_{d2}^2+N_{d2}-0,933 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2-4*1*(-0,933)}}{2*1}$$

$$= \frac{-1 \pm 2,175}{2}$$

$$= \frac{-1+2,175}{2}$$

$$N_{d2} = 0,587 \approx 1 \text{ kali/tahun}$$

$$= \frac{-1-2,175}{2}$$

$$= -1,587 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 3

$$N_{d3}(N_{d3}+1) \geq \frac{A_d H_3 D_3}{D_o(H_d+2H_o D_o/K)(A_3+M_3 B_3)}$$

$$N_{d3}(N_{d3}+1) \geq \frac{3689*160*1917,84}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000577*2250))}$$

$$N_{d3}(N_{d3}+1) \geq \frac{1131985881,6}{743368884,71}$$

$$N_{d3}(N_{d3}+1) \geq 1,522$$

$$N_{d3}^2+N_{d3}-1,522 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2-4*1*(-1,522)}}{2*1}$$

$$= \frac{-1 \pm 2,662}{2}$$

$$= \frac{-1+2,662}{2}$$

$$N_{d3} = 0,831 \approx 1 \text{ kali/tahun}$$

$$= \frac{-1-2,662}{2}$$

$$= -1,831 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 4

$$N_{d4}(N_{d4}+1) \geq \frac{A_d H_4 D_4}{D_o(H_d+2H_o D_o/K)(A_4+M_4 B_4)}$$

$$N_{d4}(N_{d4}+1) \geq \frac{3689*160*2153,78}{19635,99(128+2*123*19635,99/7.592.000)(293+(0,0006578*2250))}$$

$$N_{d4}(N_{d4}+1) \geq \frac{1271249468,16}{743827870,3}$$

$$N_{d4}(N_{d4}+1) \geq 1,709$$

$$N_{d4}^2+N_{d4}-1,709 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-1,709)}}{2*1}$$

$$= \frac{-1 \pm 2,79}{2}$$

$$= \frac{-1+2,79}{2}$$

$$= \frac{-1-2,79}{2}$$

$$N_{d4} = 0,89 \approx 1 \text{ kali/tahun}$$

$$= -1,89 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 5

$$N_{d5}(N_{d5}+1) \geq \frac{A_d H_5 D_5}{D_o(H_d+2H_o D_o/K)(A_5+M_5 B_5)}$$

$$N_{d5}(N_{d5}+1) \geq \frac{3689*160*734,86}{19635,99(128+2*123*19635,99/7.592.000)(293+(0,000181*2220))}$$

$$N_{d5}(N_{d5}+1) \geq \frac{433741405,44}{741098238,3}$$

$$N_{d5}(N_{d5}+1) \geq 0,585$$

$$N_{d5}^2+N_{d5}-0,585 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-0,585)}}{2*1}$$

$$= \frac{-1 \pm 1,827}{2}$$

$$= \frac{-1+1,827}{2}$$

$$= \frac{-1-1,827}{2}$$

$$N_{d5} = 0,413 \approx 1 \text{ kali/tahun}$$

$$= -1,413 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 6

$$N_{d6}(N_{d6}+1) \geq \frac{A_d H_6 D_6}{D_o(H_d+2H_o D_o/K)(A_6+M_6 B_6)}$$

$$N_{d6}(N_{d6}+1) \geq \frac{3689*160*1572,12}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000307*2220))}$$

$$N_{d6}(N_{d6}+1) \geq \frac{927928108,8}{741800498,72}$$

$$N_{d6}(N_{d6}+1) \geq 1,25$$

$$N_{d6}^2+N_{d6}-1,25 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-1,25)}}{2*1}$$

$$= \frac{-1 \pm 2,45}{2}$$

$$= \frac{-1+2,45}{2}$$

$$= \frac{-1-2,45}{2}$$

$$N_{d6} = 0,72 \approx 1 \text{ kali/tahun}$$

$$= -1,72 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 7

$$N_{d7}(N_{d7}+1) \geq \frac{A_d H_7 D_7}{D_o(H_d+2H_o D_o/K)(A_7+M_7 B_7)}$$

$$N_{d7}(N_{d7}+1) \geq \frac{3689*160*3769,9}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000571*2220))}$$

$$N_{d7}(N_{d7}+1) \geq \frac{2225143415,04}{743263679,18}$$

$$N_{d7}(N_{d7}+1) \geq 2,99$$

$$N_{d7}^2+N_{d7}-2,99 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-2,99)}}{2*1}$$

$$= \frac{-1 \pm 3,6}{2}$$

$$= \frac{-1+3,6}{2}$$

$$= \frac{-1-3,6}{2}$$

$$N_{d7} = 1,3 \approx 2 \text{ kali/tahun}$$

$$= -2,3 \text{ (tidak memenuhi)}$$

Frekuensi Pemesanan Pada Retailer 8

$$N_{d8}(N_{d8}+1) \geq \frac{A_d H_8 D_8}{D_o(H_d+2H_o D_o/K)(A_8+M_8 B_8)}$$

$$N_{d8}(N_{d8}+1) \geq \frac{3689*160*1922,04}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000378*2220))}$$

$$N_{d8}(N_{d8}+1) \geq \frac{1134464889,6}{742192502,05}$$

$$N_{d8}(N_{d8}+1) \geq 1,528$$

$$N_{d8}^2+N_{d8}-1,528 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-1,528)}}{2*1}$$

$$= \frac{-1 \pm 2,66}{2}$$

$$= \frac{-1+2,66}{2}$$

$$N_{d8} = 0,83 \approx 1 \text{ kali/tahun}$$

$$= \frac{-1-2,66}{2}$$

$$= -1,83 (\text{tidak memenuhi})$$

Frekuensi Pemesanan Pada Retailer 9

$$N_{d9}(N_{d9}+1) \geq \frac{A_d H_9 D_9}{D_o(H_d+2H_o D_o/K)(A_9+M_9 B_9)}$$

$$N_{d9}(N_{d9}+1) \geq \frac{3689*160*4380,81}{19635,99(128+2*123*19635,99/7.592.000)*(293+(0,000724*2250))}$$

$$N_{d9}(N_{d9}+1) \geq \frac{2585728586,112}{744208655,86}$$

$$N_{d9}(N_{d9}+1) \geq 3,47$$

$$N_{d9}^2+N_{d9}-3,47 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4*1*(-3,47)}}{2*1}$$

$$= \frac{-1 \pm 3,859}{2}$$

$$= \frac{-1+3,859}{2}$$

$$N_{d9} = 1,429 \approx 2 \text{ kali/tahun}$$

$$= \frac{-1-3,859}{2}$$

$$= -2,429 (\text{tidak memenuhi})$$

Frekuensi Pemesanan Pada *Retailer* 10

$$N_{d10}(N_{d10}+1) \geq \frac{A_d H_{10} D_{10}}{D_o (H_d + 2H_o D_o / K) (A_{10} + M_{10} B_{10})}$$

$$N_{d10}(N_{d10}+1) \geq \frac{3689 * 160 * 1568,01}{19635,99(128 + 2 * 123 * 19635,99 / 7.592.000) * (293 + (0,0007 * 2250))}$$

$$N_{d10}(N_{d10}+1) \geq \frac{925502222,4}{7440728655,86}$$

$$N_{d10}(N_{d10}+1) \geq 1,243$$

$$N_{d10}^2 + N_{d10} - 1,243 \geq 0$$

Penggunaan Rumus ABC

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-1 \pm \sqrt{1^2 - 4 * 1 * (-1,243)}}{2 * 1}$$

$$= \frac{-1 \pm 2,44}{2}$$

$$= \frac{-1 + 2,44}{2}$$

$$N_{d10} = 0,722 \approx 1 \text{ kali/tahun}$$

$$= \frac{-1 - 2,44}{2}$$

$$= -1,722 \text{ (tidak memenuhi)}$$

Tabel D.4
Rangkuman N_{dj}

| <i>Retailer</i> | Jumlah (pesan/tahun) |
|-----------------|-------------------------|
| N_{d1} | 1 |
| N_{d2} | 1 |
| N_{d3} | 1 |
| N_{d4} | 1 |
| N_{d5} | 1 |
| N_{d6} | 1 |
| N_{d7} | 2 |
| N_{d8} | 1 |
| N_{d9} | 2 |
| N_{d10} | 1 |

Langkah 3 Perhitungan Ukuran lot Produksi

$$Q_o^* = \sqrt{\left[\frac{2D_o \{ A_o + A_d N_{od} + N_{od} \sum N_{dj} (A_j + B_j \cdot M_j) \}}{H_o (1 - D_o/K + 2D_o/N_{od}K) + H_d/N_{od} + \sum H_j D_j / (N_{od} N_{dj} D_o)} \right]}$$

Tabel D.5
Perhitungan $\sum N_{dj} (A_j + B_j \cdot M_j)$

| <i>Retailer</i> | N_{dj} | A_j | B_j | M_j | Total |
|-------------------------------------|----------|-------|-------|-------------|-------------|
| 1 | 1 | 293 | 2350 | 0,000225129 | 293,529052 |
| 2 | 1 | 293 | 2150 | 0,000297364 | 293,6393318 |
| 3 | 1 | 293 | 2250 | 0,00057712 | 294,2985209 |
| 4 | 1 | 293 | 2250 | 0,000657881 | 294,4802326 |
| 5 | 1 | 293 | 2200 | 0,000181625 | 293,3995758 |
| 6 | 1 | 293 | 2200 | 0,000308 | 293,6775995 |
| 7 | 2 | 293 | 2200 | 0,000571305 | 588,5137405 |
| 8 | 1 | 293 | 2200 | 0,000378542 | 293,832793 |
| 9 | 2 | 293 | 2250 | 0,000724882 | 589,2619699 |
| 10 | 1 | 293 | 2250 | 0,000700977 | 294,5771982 |
| $\sum N_{dj} (A_j + B_j \cdot M_j)$ | | | | | 3.529,21 |

Contoh perhitungan *Retailer* 1 :

$$N_{d1} (A_1 + B_1 \cdot M_1) = 1 * (Rp 293 + (Rp 2350 * 0,000225129)) = 293,529052$$

Tabel D.6
Perhitungan $\sum H_j D_j / (N_{od} N_{dj} D_o)$

| <i>Retailer</i> | H_j | D_j | N_{od} | N_{dj} | D_o | Total |
|--------------------------------------|-------|-----------|----------|----------|-----------|-----------|
| 1 | 160 | 443,64 | 2 | 1 | 19635,995 | 1,8074562 |
| 2 | 160 | 1173 | 2 | 1 | 19635,995 | 4,7789787 |
| 3 | 160 | 1917,84 | 2 | 1 | 19635,995 | 7,813569 |
| 4 | 160 | 2153,784 | 2 | 1 | 19635,995 | 8,7748404 |
| 5 | 160 | 734,856 | 2 | 1 | 19635,995 | 2,993914 |
| 6 | 160 | 1572,12 | 2 | 1 | 19635,995 | 6,4050536 |
| 7 | 160 | 3769,896 | 2 | 2 | 19635,995 | 7,679562 |
| 8 | 160 | 1922,04 | 2 | 2 | 19635,995 | 3,9153402 |
| 9 | 160 | 4380,8088 | 2 | 2 | 19635,995 | 8,9240374 |
| 10 | 160 | 1568,01 | 2 | 1 | 19635,995 | 6,3883089 |
| $\sum H_j D_j / (N_{od} N_{dj} D_o)$ | | | | | | 59,48106 |

Contoh perhitungan *Retailer* 1 :

$$\frac{H_1 D_1}{N_{od} N_{d1} D_o} = \frac{Rp 160 * 443,64}{2 * 1 * 19635,995} = 1,807$$

$$Q_0^* = \sqrt{\frac{2D_0 \{ A_0 + A_d N_{od} + N_{od} \sum N_{dj} (A_j + B_j \cdot M_j) \}}{H_0 (1 - D_0/K + 2D_0/N_{od}K) + H_d/N_{od} + \sum H_j D_j / (N_{od} N_{dj} D_0)}}$$

$$Q_0^* = \sqrt{\frac{2 * 19635,995 \{ 10146 + 3689 * 2 + 2 * 3529,21 \}}{123 (1 - \frac{19635,995}{7.592.000} + 2 * \frac{19635,995}{2} * 7.592.000) + 128/2 + 59,48106}}$$

$$Q_0^* = 1963,539 \approx 1964 \text{ unit}$$

Jadi ukuran lot produksi pada produsen adalah 1964 unit

$$T = \frac{Q_0}{D_0}$$

$$T = \frac{1963,539}{19635,995}$$

$$T = 0,099 \text{ tahun}$$

Langkah 4 Perhitungan Ukuran lot Pemesanan pada DC

$$Q_d = T * \frac{D_0}{N_{od}}$$

$$= 0,099 * \frac{19635,995}{2}$$

$$Q_d = 981,769 \approx 982 \text{ unit}$$

Jadi ukuran lot pemesanan pada DC adalah 982 unit

Tabel D.7
Rangkuman Perhitungan Qj

| <i>Retailer</i> | Dj | T | Nod | Nd1 | Qj | Pembulatan Qj (unit) |
|-----------------|-----------|-------------|-----|-----|-------------|----------------------|
| 1 | 443,64 | 0,099996965 | 2 | 1 | 22,18132684 | 23 |
| 2 | 1173 | 0,099996965 | 2 | 1 | 58,64822015 | 59 |
| 3 | 1917,84 | 0,099996965 | 2 | 1 | 95,88908997 | 96 |
| 4 | 2153,784 | 0,099996965 | 2 | 1 | 107,685932 | 108 |
| 5 | 734,856 | 0,099996965 | 2 | 1 | 36,74168497 | 37 |
| 6 | 1572,12 | 0,099996965 | 2 | 1 | 78,60361455 | 79 |
| 7 | 3769,896 | 0,099996965 | 2 | 2 | 94,24453988 | 95 |
| 8 | 1922,04 | 0,099996965 | 2 | 1 | 96,0990836 | 97 |
| 9 | 4380,8088 | 0,099996965 | 2 | 2 | 109,5168964 | 110 |
| 10 | 1568,01 | 0,099996965 | 2 | 1 | 78,39812079 | 79 |

Contoh Perhitungan Q1 :

$$Q_j = \frac{D_j * T}{N_{od} * N_{d1}}$$

$$Q_1 = \frac{443,64 * 0,099}{2 * 1} = 22,181 \approx 23 \text{ unit}$$

Langkah 5 Perhitungan Ongkos Tahunan pada *Retailer*

$C_{ret\ total}$ = Ongkos pesan + ongkos simpan + ongkos kekurangan

$$C_{ret\ total} = \sum \left\{ A_j D_j / Q_j + H_j \left(\frac{Q_j}{2} + SS_j \right) + B_j M_j D_j / Q_j \right\}$$

$$C_{ret\ 1} = \left(\frac{A_j D_j}{Q_j} + H_j \left(\frac{Q_j}{2} + SS_j \right) + \frac{B_j M_j D_j}{Q_j} \right)$$

$$C_{ret\ 1} = \left(\frac{293 * 443,64}{23} + 160 \left(\frac{23}{2} + 4,48 \right) + \frac{2350 * 0,000225 * 443,64}{23} \right)$$

$$= 8362,06$$

$$C_{ret\ 2} = \left(\frac{293 * 1173}{59} + 160 \left(\frac{59}{2} + 4,67 \right) + \frac{2150 * 0,000297 * 1173}{59} \right)$$

$$= 11312,02$$

$$C_{ret\ 3} = \left(\frac{293 * 1917,84}{96} + 160 \left(\frac{96}{2} + 9,65 \right) + \frac{2250 * 0,000577 * 1917,84}{96} \right)$$

$$= 15101,27$$

$$C_{ret\ 4} = \left(\frac{293 * 2153,784}{108} + 160 \left(\frac{108}{2} + 7,48 \right) + \frac{2250 * 0,0006578 * 2153,784}{108} \right)$$

$$= 15701,45$$

$$C_{ret\ 5} = \left(\frac{293 * 734,856}{37} + 160 \left(\frac{37}{2} + 6,32 \right) + \frac{2200 * 0,000181 * 734,856}{37} \right)$$

$$= 9818,7$$

$$C_{ret\ 6} = \left(\frac{293 * 1572,12}{v} + 160 \left(\frac{79}{2} + 11,3 \right) + \frac{2200 * 0,0003079 * 1572,12}{79} \right)$$

$$= 13970,01$$

$$C_{ret\ 7} = \left(\frac{293 * 3769,896}{95} + 160 \left(\frac{95}{2} + 11,65 \right) + \frac{2200 * 0,000571 * 3769,896}{95} \right)$$

$$= 21174,19$$

$$C_{ret\ 8} = \left(\frac{293 * 1922,04}{97} + 160 \left(\frac{97}{2} + 9,65 \right) + \frac{2200 * 0,000378 * 1922,04}{97} \right)$$

$$= 15108,76$$

$$C_{ret\ 9} = \left(\frac{293 * 4380,8}{110} + 160 \left(\frac{110}{2} + 11,65 \right) + \frac{2250 * 0,000724 * 4380,8}{110} \right)$$

$$= 22410,94$$

$$C_{ret\ 10} = \left(\frac{293 * 1568,01}{79} + 160 \left(\frac{79}{2} + 7 \right) + \frac{2250 * 0,0007 * 1568,01}{79} \right)$$

$$= 13283,57$$

Tabel D.8
Rangkuman Ongkos Tahunan *Retailer*

| Cretiler | Ongkos Pesan (Rp/pesan) | Ongkos Simpan (Rp/tahun) | Ongkos Kekurangan (Rp) | Total (Rp) |
|----------|-------------------------|--------------------------|------------------------|----------------------|
| Cret1 | 5.860,17784 | 2.491,30615 | 10,58136 | 8.362,06535 |
| Cret2 | 5.860,17784 | 5.439,05761 | 12,78702 | 11.312,02247 |
| Cret3 | 5.860,17784 | 9.215,12720 | 25,97121 | 15.101,27624 |
| Cret4 | 5.860,17784 | 9.811,67456 | 29,60555 | 15.701,45795 |
| Cret5 | 5.860,17784 | 3.950,53480 | 7,99176 | 9.818,70439 |
| Cret6 | 5.860,17784 | 8.096,28916 | 13,55240 | 13.970,01940 |
| Cret7 | 11.720,35568 | 9.403,56319 | 50,27634 | 21.174,19520 |
| Cret8 | 5.860,17784 | 9.231,92669 | 16,65636 | 15.108,76089 |
| Cret9 | 11.720,35568 | 10.625,35171 | 65,24138 | 22.410,94877 |
| Cret10 | 5.860,17784 | 7.391,84966 | 31,54492 | 13.283,57242 |
| Total | 70.322,13406 | 75.656,68073 | 264,20830 | 146.243,02309 |

Langkah 6 Perhitungan Ongkos Tahunan pada DC

$$C_{dep} = A_d D_d / Q_d + H_d \left\{ Q_d / 2 + \sum (L_{dj} D_j + SS_j) \right\}$$

$$\begin{aligned} \sum (L_{dj} D_j + SS_j) &= (L_{d1} D_1 + SS_1) + (L_{d2} D_2 + SS_2) + (L_{d3} D_3 + SS_3) + (L_{d4} D_4 + SS_4) + (L_{d5} D_5 + SS_5) \\ &\quad + (L_{d6} D_6 + SS_6) + (L_{d7} D_7 + SS_7) + (L_{d8} D_8 + SS_8) + (L_{d9} D_9 + SS_9) + (L_{d10} D_{10} \\ &\quad + SS_{10}) \\ &= (0,0033 * 443,64 + 4,48) + (0,0033 * 1173 * 4,67) + (0,0033 * 1917,84 + 9,65) + \\ &\quad (0,0033 * 2153,784 + 7,48) + (0,0033 * 734,856 + 6,32) + (0,0033 * 1572,12 + 11,3) + \\ &\quad (0,0033 * 3769,89 + 11,65) + (0,0033 * 1922,04 + 9,65) + (0,0033 * 4380,8 + 11,65) + \\ &\quad (0,0033 * 1568,01 + 7) \\ &= 149,303 \end{aligned}$$

$$C_{dep} = 3689 * \frac{19635,99}{981,76} + 128 * \left(\frac{981,76}{2} + 149,303 \right)$$

$$C_{dep} = \text{Rp} 155.726,34$$

Langkah 7 Perhitungan Ongkos Tahunan pada Produksi

$$C_{pro} = A_o D_o / Q_o + H_o \left(\left\{ \sum (Q_o / K + L_{od} + L_{dj}) D_j + SS_j + (1 - D_o / K) Q_o / 2 \right\} \right)$$

$$\begin{aligned} &\sum (Q_o / K + L_{od} + L_{dj}) D_j + SS_j \\ &= \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 443,64 + 4,48 \right\} + \\ &\quad \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 1173 + 4,67 \right\} + \end{aligned}$$

$$\begin{aligned}
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 1917,84 + 9,65 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 2153,784 + 7,48 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 734,856 + 6,32 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 1572,12 + 11,3 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 3769,89 + 11,65 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 1922,04 + 9,65 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 4380,8 + 11,65 \right\} + \\
& \left\{ \left(\frac{1963,53}{7.592.000} + 0,0033 + 0,0033 \right) * 1568,01 + 7 \right\} + \\
& = 219,835
\end{aligned}$$

$$\begin{aligned}
C_{\text{pro}} &= A_o D_o / Q_o + H_o \left\{ \sum \left(\frac{Q_o}{K} + L_{od} + L_{dj} \right) D_j + SS_j + \left(1 - \frac{D_o}{K} \right) Q_o / 2 \right\} \\
C_{\text{pro}} &= 10146 * \frac{19635,995}{1963,53} + 123 * \left\{ 219,835 + \left(1 - \frac{19635,995}{7.592.000} \right) * 1963,53 / 2 \right\} \\
&= \mathbf{Rp248.948,18}
\end{aligned}$$

Langkah 8 Perhitungan Ongkos Transportasi

$$\begin{aligned}
C_{\text{tran}} &= \sum (C_{od} + C_{dj}) D_j \\
&= \{(C_{od} + C_{d1})D_1\} + \{(C_{od} + C_{d2})D_2\} + \{(C_{od} + C_{d3})D_3\} + \{(C_{od} + C_{d4})D_4\} + \\
&\quad \{(C_{od} + C_{d5})D_5\} + \{(C_{od} + C_{d6})D_6\} + \{(C_{od} + C_{d7})D_7\} + \{(C_{od} + C_{d8})D_8\} + \\
&\quad \{(C_{od} + C_{d9})D_9\} + \{(C_{od} + C_{d10})D_{10}\} \\
&= \{(23,706 + 17,728) * 443,64\} + \{(23,706 + 5,857) * 1173\} + \{(23,706 + 14,525) * \\
&\quad 1917,84\} + \{(23,706 + 12,261) * 2153,784\} + \{(23,706 + 8,434) * 734,85\} + \\
&\quad \{(23,706 + 9,059) * 1572,12\} + \{(23,706 + 6,482) * 3769,896\} + \{(23,706 + 9,059) * \\
&\quad 1922,04\} + \{(23,706 + 11,636) * 4380,8\} + \{(23,706 + 9,684) * 1568,01\} \\
&= \mathbf{Rp662.930,98}
\end{aligned}$$

Langkah 9 Perhitungan Ongkos Ongkos Operasi Tahunan

$$\begin{aligned}
C_{\text{tot}} &= C_{\text{ret}} + C_{\text{dep}} + C_{\text{pro}} + C_{\text{tran}} \\
&= \text{Rp}146.243,02 + \text{Rp}155.726,34 + \text{Rp}248.948,18 + \text{Rp}662.930,98 \\
&= \mathbf{Rp1.213.848,52}
\end{aligned}$$

Langkah 10 Perhitungan *Reorder Point* pada *Supplier*

$$\begin{aligned}
R_o &= \sum \left\{ \left(\frac{Q_d}{K} + L_{od} + L_{dj} \right) D_j + SS_j \right\} \\
&= \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 443,64 + 4,48 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 1173 + 4,67 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 1917,84 + 9,65 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 2153,784 + 7,48 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 734,856 + 6,32 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 1572,12 + 11,3 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 3769,89 + 11,65 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 1922,04 + 9,65 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 4380,8 + 11,65 \right\} + \\
&\quad \left\{ \left(\frac{981,769}{7.592.000} + 0,0033 + 0,0033 \right) 1568,01 + 7 \right\} \\
&= \{7,49\} + \{12,64\} + \{22,68\} + \{22,11\} + \{11,31\} + \{21,98\} + \{37,27\} + \\
&\quad \{22,71\} + \{41,42\} + \{17,65\} \\
&= 217,3 \text{ unit}
\end{aligned}$$

Perhitungan *Reorderpoint Supplier* (disagregasi)

Didapat hasil perhitungan reorderpoint pada *supplier* dengan hasil 217,3 unit agregat (dalam kemasan 1500ml). Sehingga dilakukan perhitungan disagregasi produk untuk didapat hasil reorder point dalam kemasan 1500ml, 620ml, dan 250ml.

Tabel D.9
Perhitungan Proporsi Produk

| Produk | Permintaan Masa Lalu (unit) | Hasil Konversi ke Kemasan 1500ml (unit) | Proporsi Produk |
|--------|-----------------------------|---|-----------------|
| 1500ml | 2.905 | 2.905 | 0,29502 |
| 620ml | 3.164 | 1.307,79 | 0,132814 |
| 250ml | 33.804 | 5.634,00 | 0,572166 |
| Total | | 9.846,79 | |

Permintaan masa lalu terdapat pada Tabel 4.7, Tabel 4.8, Tabel 4.9, kemudian total permintaan tersebut dikonversikan kedalam kemasan 1500ml. Berikut ini perhitungannya :

$$\text{Konversi produk} = \text{permintaan} \frac{\text{kemasan produk}}{1.500\text{ml}}$$

$$\text{Konversi produk} = 2.905 * \frac{1.500\text{ml}}{1.500\text{ml}} = 2.905 \text{ unit}$$

$$\text{proporsi permintaan} = \frac{\text{Hasil konversi}}{\text{total}}$$

$$\text{proporsi permintaan} = \frac{2.905}{9.846,79} = 0,295$$

Tabel D.10
Perhitungan *Reorder Point Supplier*

| Produk | Proporsi | <i>Reorder point</i> (unit agregat) | <i>Reorder point</i> (1500ml) | <i>Reorder point</i> (unit) |
|--------|----------|-------------------------------------|-------------------------------|-----------------------------|
| 1500ml | 0,29502 | 217,29 | 64,10492 | 64,10 ≈ 65 |
| 620ml | 0,132814 | 217,29 | 28,85906 | 69,82 ≈ 70 |
| 250ml | 0,572166 | 217,29 | 124,326 | 745,95 ≈ 746 |

Contoh perhitungan :

$$\text{Reorder point (1500ml)} = \frac{\text{proporsi}}{\text{reorder point (unit agregat)}}$$

$$\text{Reorder point (1500ml)} = \frac{0,29502}{217,29} = 64,10492$$

$$\text{Reorder point (unit)} = \text{reorder point (1500ml)} * \frac{1500\text{ml}}{\text{kemasan produk}}$$

$$\text{Reorder point (unit)} = 64,10492 * \frac{1500\text{ml}}{1500\text{ml}} = 64,10492$$

Kesimpulan :

Supplier melakukan *Reorder point* bila produk 1500ml mencapai 65 unit, produk 620ml mencapai 70 unit, dan 250ml mencapai 756 unit.

Langkah 11 Perhitungan *Reoder Point DC*

Perhitungan *reorder point* pada DC:

$$\begin{aligned}
 R_d &= \sum \{(L_{od} + L_{dj})D_j + SS_j\} \\
 &= \{(0,0033 + 0,0033)443,64 + 4,48\} + \{(0,0033 + 0,0033)1173 + 4,67\} + \\
 &\quad \{(0,0033 + 0,0033)1917,84 + 9,65\} + \{(0,0033 + 0,0033)2153,784 + \\
 &\quad 7,48\} + \{(0,0033 + 0,0033)734,85 + 6,32\} + \{(0,0033 + 0,0033)1572,12 + \\
 &\quad 11,3\} + \{(0,0033 + 0,0033)3769,89 + 11,65\} + \\
 &\quad \{(0,0033 + 0,0033)1922,04 + 9,65\} + \{(0,0033 + 0,0033)4380,8 + 11,65\} + \\
 &\quad \{(0,0033 + 0,0033)1568,01 + 7\} \\
 &= \{7,4376\} + \{12,49\} + \{22,43\} + \{21,83\} + \{11,21\} + \{21,78\} + \\
 &\quad \{36,78\} + \{22,46\} + \{40,85\} + \{17,45\} \\
 &= 214,75 \text{ unit.}
 \end{aligned}$$

Perhitungan *Reorderpoint DC* (disagregasi)

Didapat hasil perhitungan *reoder point DC* berupa unit agregat, maka diperlukan dilakukan perhitungan *reorderpoint* untuk masing-masing produk dengan melakukan disagregasi produk.

Tabel D.11
Perhitungan *Reorder Point DC*

| Produk | Proporsi | <i>Reorder point</i> (unit agregat) | <i>Reorder point</i> (1500ml) | <i>Reorder point</i> (unit) |
|--------|----------|--|----------------------------------|--------------------------------|
| 1500ml | 0,29502 | 214,75 | 63,35557 | 63,35 ≈ 64 |
| 620ml | 0,132814 | 214,75 | 28,52171 | 69,004 ≈ 70 |
| 250ml | 0,572166 | 214,75 | 122,8727 | 737,23 ≈ 738 |

Contoh perhitungan :

$$\text{Reorder point (1500ml)} = \frac{\text{proporsi}}{\text{reorder point (unit agregat)}}$$

$$\text{Reorder point (1500ml)} = \frac{0,29502}{214,75} = 63,35557$$

$$\text{Reorder point (unit)} = \text{reorder point (1500ml)} * \frac{1500\text{ml}}{\text{kemasan produk}}$$

$$\text{Reorder point (unit)} = 63,35557 * \frac{1500\text{ml}}{1500\text{ml}} = 63,35$$

Kesimpulan :

DC melakukan *Reorder point* ketika persediaan produk 1500ml mencapai 64 unit, 620ml mencapai 70 unit, 250ml mencapai 738 unit.

Langkah 12 Perhitungan *Reoder Point* pada *Retailer*

$$\text{Rumus : } R_j = L_{dj} D_j + SS_j$$

Tabel D.12

Reorder Point Retailer (unit agrergat)

| <i>Retailer</i> | Ldj | Dj (unit) | SSj (unit) | Total Rj (unit agregat) |
|-----------------|------------|----------------------|-----------------------|------------------------------------|
| R ₁ | 0,0033 | 443,64 | 4,48 | 5,95 |
| R ₂ | 0,0033 | 1173 | 4,67 | 8,58 |
| R ₃ | 0,0033 | 1917,84 | 9,65 | 16,04 |
| R ₄ | 0,0033 | 2153,784 | 7,48 | 14,65 |
| R ₅ | 0,0033 | 734,856 | 6,32 | 8,76 |
| R ₆ | 0,0033 | 1572,12 | 11,3 | 16,54 |
| R ₇ | 0,0033 | 3769,896 | 11,65 | 24,21 |
| R ₈ | 0,0033 | 1922,04 | 9,65 | 16,05 |
| R ₉ | 0,0033 | 4380,8088 | 11,65 | 26,25 |
| R ₁₀ | 0,0033 | 1568,01 | 7 | 12,2 |

Contoh perhitungan :

$$\begin{aligned} R_1 &= L_{d1} D_1 + SS_1 \\ &= 0,0033 * 443,64 + 4,48 \\ &= 5,95 \end{aligned}$$

Perhitungan *Reoder Point Retailer* (disagregasi)

Data permintaan masa lalu untuk ketiga produk dapat dilihat dari Tabel 4.7, Tabel 4.8, dan Tabel 4.8. Pada Tabel D.13 merupakan rangkuman permintaan masa lalu untuk produk 1500ml, 620ml dan 250ml.

Tabel D.13
Rangkuman Permintaan Masa Lalu

| No. | Nama Retailer | Ukuran Produk | | |
|-----|---------------|---------------|-------|-------|
| | | 1500ml | 620ml | 250ml |
| 1 | Batu jajar | 74 | 410 | 0 |
| 2 | Cicadas | 287 | 0 | 1772 |
| 3 | Cihanjuang | 306 | 310 | 3418 |
| 4 | Kopo 373 | 217 | 733 | 3261 |
| 5 | Kordon | 145 | 146 | 969 |
| 6 | Lewipanjang | 292 | 281 | 2233 |
| 7 | M.Ramdan | 609 | 538 | 6153 |
| 8 | Pagarsih | 383 | 297 | 2849 |
| 9 | Sarimanah | 520 | 449 | 8737 |
| 10 | Singosari | 72 | 0 | 4412 |

Pada Tabel D.14 dilakukan konversi masing-masing produk ke dalam 1500ml.

Tabel D.14
Proporsi Produk

| No. | Nama Retailer | Ukuran Produk (unit 1500ml) | | | Total | Proporsi | | |
|-----|---------------|-----------------------------|---------|----------|----------|----------|-------|-------|
| | | 1500ml | 620ml | 250ml | | 1500ml | 620ml | 250ml |
| 1 | Batujajar | 74 | 169,467 | 0 | 243,467 | 0,304 | 0,696 | 0 |
| 2 | Cicadas | 287 | 0 | 295,333 | 582,333 | 0,493 | 0 | 0,507 |
| 3 | Cihanjuang | 306 | 128,133 | 569,667 | 1003,800 | 0,305 | 0,128 | 0,568 |
| 4 | Kopo 373 | 217 | 302,973 | 543,500 | 1063,473 | 0,204 | 0,285 | 0,511 |
| 5 | Kordon | 145 | 60,347 | 161,500 | 366,847 | 0,395 | 0,165 | 0,440 |
| 6 | Lewipanjang | 292 | 116,147 | 372,167 | 780,313 | 0,374 | 0,149 | 0,477 |
| 7 | M.Ramdan | 609 | 222,373 | 1025,500 | 1856,873 | 0,328 | 0,120 | 0,552 |
| 8 | Pagarsih | 383 | 122,760 | 474,833 | 980,593 | 0,391 | 0,125 | 0,484 |
| 9 | Sarimanah | 520 | 185,587 | 1456,167 | 2161,753 | 0,241 | 0,086 | 0,674 |
| 10 | Singosari | 72 | 0 | 735,333 | 807,333 | 0,089 | 0 | 0,911 |

Contoh perhitungan Batujajar:

$$\text{Proporsi} = \frac{\text{ukuran produk}}{\text{Total}}$$

$$\text{Proporsi 1500ml} = \frac{74}{243,467} = 0,304$$

Tabel D.15
Reorder Point Retailer

| No. | Nama Retailer | Total Rj (unit agregat) | Ukuran Produk (unit 1500ml) | | | Ukuran produk (unit) | | |
|-----|---------------|-------------------------|-----------------------------|-------|--------|----------------------|-------------|---------------|
| | | | 1500ml | 620ml | 250ml | 1500ml | 620ml | 250ml |
| 1 | Batu jajar | 5,95 | 1,811 | 4,148 | 0 | 1,811 ≈ 2 | 10,035 ≈ 11 | 0 |
| 2 | Cicadas | 8,58 | 4,229 | 0 | 4,351 | 4,229 ≈ 5 | 0 | 26,108 ≈ 27 |
| 3 | Cihanjuang | 16,04 | 4,891 | 2,048 | 9,104 | 4,891 ≈ 5 | 4,954 ≈ 5 | 54,627 ≈ 55 |
| 4 | Kopo 373 | 14,65 | 2,991 | 4,176 | 7,492 | 2,991 ≈ 3 | 10,104 ≈ 11 | 44,951 ≈ 45 |
| 5 | Kordon | 8,76 | 3,466 | 1,443 | 3,861 | 3,466 ≈ 4 | 3,490 ≈ 4 | 23,164 ≈ 24 |
| 6 | Lewipanjang | 16,54 | 6,190 | 2,462 | 7,889 | 6,190 ≈ 7 | 5,956 ≈ 6 | 47,333 ≈ 48 |
| 7 | M.Ramdan | 24,21 | 7,942 | 2,900 | 13,374 | 7,942 ≈ 8 | 7,016 ≈ 8 | 80,244 ≈ 81 |
| 8 | Pagarsih | 16,05 | 6,271 | 2,010 | 7,775 | 6,271 ≈ 7 | 4,863 ≈ 5 | 46,651 ≈ 47 |
| 9 | Sarimanah | 26,25 | 6,315 | 2,254 | 17,684 | 6,315 ≈ 7 | 5,453 ≈ 6 | 106,104 ≈ 107 |
| 10 | Singosari | 12,2 | 1,090 | 0 | 11,136 | 1,090 ≈ 2 | 0 | 66,818 ≈ 67 |

Contoh perhitungan :

$$\text{ukuran produk (unit 1500ml)} = \text{Proporsi} * \text{Total Rj}$$

$$\text{ukuran produk (unit 1500ml)} = 0,304 * 5,95 = 1,811$$

$$\text{ukuran produk (unit)} = \text{unit produk (unit 1500ml)} * \frac{1500\text{ml}}{\text{ukuran produk}}$$

$$\text{ukuran produk 1500ml (unit)} = 1,811 * \frac{1500\text{ml}}{1500\text{ml}} = 1,811 \approx 2 \text{ unit}$$

PERHITUNGAN KEKURANGAN UNTUK KASUS *LOST SALES*

Iterasi 1 retailer Batujajar

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 443,64}{160}} = 23,2407$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \Phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 23,2407}{160 * 23,2407 + 2350 * 443,64} = 0,0036$$

3. Perhitungan nilai r :

$$F(r_1) = 0,0036 \rightarrow \text{(tabel } Z = 2,69)$$

$$Z = \frac{r - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$r_1 = (2,69 * 0,2022) + 1,4788$$

$$= 2,0229$$

4. Koordinat dari distribusi normal :

$$\Phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,69 \rightarrow 0,0107$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r) \Phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r_1 - \mu_L}{\sigma_L}$$

$$\eta(r) = (1,4788 - 2,0229) * 0,0036 + 0,2022 * 0,0107 = 0,00023$$

Iterasi 2 retailer Batujajar

1. Menghitung nilai Q baru dengan menggunakan nilai $(\eta(r_1))$ yang diperoleh dari iterasi 1 langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 443,64(97,4 + 2350 * 0,00023)}{160}} = 23,3053$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 23,3053}{160 * 23,3053 + 2350 * 443,64} = 0,0036$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,0036 \rightarrow \text{(tabel } Z = 2,69)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,69 * 0,2022) + 1,4788$$

$$= 2,0229$$

4. Koordinat dari distribusi normal :

$$\phi \frac{r_2 - \mu_L}{\sigma_L}$$

$$Z = 2,69 \rightarrow 0,0107$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$2,0229 \geq 2,0229, \text{ (sesuai syarat)}$$

6. Perhitungan $\eta(r_2)$

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r_2 - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (1,4788 - 2,0229) * 0,0036 + 0,2022 * 0,0107 = \mathbf{0,000225}$$

Iterasi 1 retailer Cicadas

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 1173}{160}} = 37,7906$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \Phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 37,7906}{160 * 37,7906 + 2150 * 1173} = 0,0024$$

3. Perhitungan nilai r_1 :

$$F(r_1) = 0,0024 \rightarrow \text{(tabel } Z = 2,82)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$r_1 = (2,82 * 0,406) + 3,91$$

$$= 5,055$$

4. Koordinat distribusi normal :

$$\varphi \frac{r_1 - \mu_L}{\sigma_L}$$

$$Z = 2,82 \rightarrow 0,0075$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r) = (\mu_L - r_1) \Phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \varphi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (3,91 - 5,055) * 0,0024 + 0,406 * 0,0075 = 0,000307$$

Iterasi 2 retailer Cicadas

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari iterasi 1 langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r_1))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 1173(97,4 + 2150 * 0,000307)}{160}} = 37,9182$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 37,9182}{160 * 37,9182 + 2350 * 443,64} = 0,0024$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,0024 \rightarrow \text{(tabel } Z = 2,82)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,82 * 0,406) + 3,91$$

$$= 5,055$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,82 \rightarrow 0,0075$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$5,055 \geq 5,055, \text{ (sesuai syarat)}$$

6. Perhitungan $\eta(r_2)$

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r_2 - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (1,4788 - 5,055) * 0,0024 + 0,406 * 0,0075 = \mathbf{0,000297}$$

Iterasi 1 retailer Cihanjuang

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 1917,84}{160}} = 48,3215$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \Phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 48,3215}{160 * 48,3215 + 2250 * 1917,84} = 0,0018$$

3. Perhitungan nilai r :

$$F(r_1) = 0,0018 \rightarrow \text{(tabel } Z = 2,91)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (2,91 * 1,0330) + 6,3928 \\ &= 9,398 \end{aligned}$$

4. Koordinat distribusi normal :

$$\varphi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,91 \rightarrow 0,0058$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r) = (\mu_L - r_1) \Phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \varphi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r) = (6,3928 - 9,398) * 0,0018 + 1,0330 * 0,0058 = 0,000615$$

Iterasi 2 retailer Cihanjuang

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 1917,84(97,4 + 2250 * 0,000615)}{160}} = 48,6636$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 48,6636}{160 * 48,6636 + 2350 * 443,64} = 0,0018$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,0018 \rightarrow (\text{tabel } Z = 2,91)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,91 * 1,0330) + 6,3928$$

$$= 9,398$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,91 \rightarrow 0,0058$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$9,398 \geq 9,398, (\text{sesuai syarat})$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (6,3928 - 9,398) * 0,0018 + 1,0330 * 0,0058 = 0,000577$$

Iterasi 1 retailer Kopo 373

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 2153,784}{160}} = 51,2077$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r) = \Phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r) = \frac{160 * 51,2077}{160 * 51,2077 + 2250 * 2153,784} = 0,00169$$

3. Perhitungan nilai r :

$$F(r_1) = 0,00169 \gg (\text{tabel } Z = 2,93)$$

$$z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (2,93 * 1,2792) + 7,1793 \\ &= 10,9275 \end{aligned}$$

4. Koordinat distribusi normal :

$$\varphi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,93 \rightarrow 0,0055$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \Phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \varphi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (7,1793 - 10,9275) * 0,00169 + 1,2792 * 0,0055 = 0,000709$$

Iterasi 2 retailer Kopo 373

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 2153,784(97,4 + 2250 * 0,000709)}{160}} = 51,6256$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 51,6256}{160 * 51,6256 + 2350 * 443,64} = 0,0017$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,0017 \rightarrow \text{(tabel } Z = 2,93)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,93 * 1,2792) + 7,1793$$

$$= 10,9275$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,93 \rightarrow 0,0055$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$10,9275 \geq 10,9275, \text{ (sesuai syarat)}$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (7,1793 - 10,9275) * 0,00169 + 1,2792 * 0,0055 = 0,000658$$

Iterasi 1 retailer Kordon

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 734,856}{160}} = 29,9113$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 29,9113}{160 * 29,9113 + 2200 * 734,856} = 0,00306$$

3. Perhitungan nilai r :

$$F(r) = 0,0030 \rightarrow \text{(tabel } Z = 2,75)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (2,75 * 0,1879) + 2,4495 \\ &= 2,966 \end{aligned}$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,75 \rightarrow 0,0091$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (2,4495 - 2,966) * 0,00306 + 0,1879 * 0,0091 = 0,000185$$

Iterasi 2 retailer Kordon

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 734,856(97,4 + 2200 * 0,000185)}{160}} = 29,9737$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 29,9737}{160 * 29,9737 + 2350 * 443,64} = 0,003$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,003 \rightarrow \text{(tabel } Z = 2,75)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,75 * 0,1879) + 2,4495$$

$$= 2,966$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,75 \rightarrow 0,0091$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$2,966 \geq 2,966, \text{ (sesuai syarat)}$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (2,4495 - 2,966) * 0,003 + 0,1879 * 0,0091 = \mathbf{0,000182}$$

Iterasi 1 retailer Lewipanjang

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 1572,12}{160}} = 43,7499$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 43,7499}{160 * 43,7499 + 2200 * 1572,12} = 0,0020$$

3. Perhitungan nilai r :

$$F(r) = 0,0020 \gg (\text{tabel } Z = 2,88)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (2,88 * 0,6669) + 5,2404 \\ &= 7,161 \end{aligned}$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,88 \rightarrow 0,0063$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (5,2404 - 7,161) * 0,0020 + 0,6669 * 0,0063 = 0,000322$$

Iterasi 2 retailer Lewipanjang

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 1572,12(97,4 + 2200 * 0,000322)}{160}} = 43,9088$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 43,9088}{160 * 43,9088 + 2350 * 443,64} = 0,002$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,002 \rightarrow (\text{tabel } Z = 2,88)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,88 * 0,6669) + 5,2404$$

$$= 7,161$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,88 \rightarrow 0,0063$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$7,161 \geq 7,161, (\text{sesuai syarat})$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (5,2404 - 7,161) * 0,0020 + 0,6669 * 0,0063 = \mathbf{0,000308}$$

Iterasi 1 retailer M.Ramdan

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 3769,896}{160}} = 67,7484$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 67,7484}{160 * 67,7484 + 2200 * 3769,896} = 0,00131$$

3. Perhitungan nilai r :

$$F(r) = 0,00131 \gg (\text{tabel } Z = 3,01)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (3,01 * 1,6612) + 12,5663 \\ &= 17,566 \end{aligned}$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 3,01 \rightarrow 0,0043$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (12,5663 - 17,566) * 0,00131 + 1,6612 * 0,0043 = 0,000617$$

Iterasi 2 retailer M.Ramdan

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 3769,896(97,4 + 2200 * 0,000617)}{160}} = 68,2185$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 68,2185}{160 * 68,2185 + 2350 * 443,64} = 0,00131$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,00131 \rightarrow (\text{tabel } Z = 3,01)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (3,01 * 1,6612) + 12,5663$$

$$= 17,566$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 3,01 \rightarrow 0,0043$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$17,566 \geq 17,566, (\text{sesuai syarat})$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (12,5663 - 17,566) * 0,00131 + 1,6612 * 0,0043 = 0,000571$$

Iterasi 1 retailer Pagarsih

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 1922,04}{160}} = 48,3744$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 48,3744}{160 * 48,3744 + 2200 * 1922,04} = 0,0018$$

3. Perhitungan nilai r :

$$F(r_1) = 0,0018 \rightarrow \text{(tabel } Z = 2,91)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$r_1 = (2,91 * 0,824) + 6,4068$$

$$= 8,8046$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,91 \rightarrow 0,0058$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (6,4068 - 8,8046) * 0,0018 + 0,824 * 0,0058 = 0,000398$$

Iterasi 2 retailer Pagarsih

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 1922,04(97,4 + 2200 * 0,000398)}{160}} = 48,5914$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 48,5914}{160 * 48,5914 + 2350 * 443,64} = 0,0018$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,0018 \rightarrow \text{(tabel } Z = 2,91)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,91 * 0,824) + 6,4068$$

$$= 8,8046$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,91 \rightarrow 0,0058$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$8,8046 \geq 8,8046, \text{ (sesuai syarat)}$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (6,4068 - 8,8046) * 0,0018 + 0,824 * 0,0058 = \mathbf{0,000379}$$

Iterasi 1 retailer Sarimanah

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 4380,8}{160}} = 73,0317$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 73,0317}{160 * 73,0317 + 2250 * 4380,8} = 0,00118$$

3. Perhitungan nilai r :

$$F(r) = 0,00118 \rightarrow \text{(tabel } Z = 3,04)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (3,04 * 1,971) + 14,6027 \\ &= 20,594 \end{aligned}$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 3,04 \rightarrow 0,004$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (14,6027 - 20,594) * 0,00118 + 1,971 * 0,004 = 0,000789$$

Iterasi 2 retailer Sarimanah

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r_1))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 4380,8(97,4 + 2250 * 0,000789)}{160}} = 73,6944$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 73,6944}{160 * 73,6944 + 2350 * 443,64} = 0,00119$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,00119 \rightarrow \text{(tabel } Z = 3,04)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$v = (3,04 * 1,971) + 14,6027$$

$$= 20,594$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 3,04 \rightarrow 0,004$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$8,8046 \geq 8,8046, \text{ (sesuai syarat)}$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (14,6027 - 20,594) * 0,00118 + 1,971 * 0,004 = \mathbf{0,000725}$$

Iterasi 1 retailer Singosari

1. Q deterministik sebagai nilai awal

$$Q = \sqrt{\frac{2 * A * \lambda}{h}}$$

$$Q_1 = \sqrt{\frac{2 * 97,4 * 1568,01}{160}} = 43,6927$$

2. Hitung probabilitas terjadinya kekurangan persamaan (F(r)) untuk kasus *lost sales*.

$$F(r_1) = \Phi \frac{r_1 - \mu_L}{\sigma_L} = \frac{h Q}{h Q + \pi \lambda}$$

$$F(r_1) = \frac{160 * 43,6927}{160 * 43,6927 + 2250 * 1568,01} = 0,0020$$

3. Perhitungan nilai r :

$$F(r) = 0,0020 \rightarrow \text{(tabel } Z = 2,88)$$

$$Z = \frac{r_1 - \mu_L}{\sigma_L}$$

$$r_1 = (Z \sigma_L) + \mu_L$$

$$\begin{aligned} r_1 &= (2,88 * 1,265) + 5,2267 \\ &= 8,867 \end{aligned}$$

4. Koordinat distribusi normal :

$$\varphi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,88 \rightarrow 0,0063$$

5. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_1) = (\mu_L - r_1) \Phi \frac{r_1 - \mu_L}{\sigma_L} + \sigma_L * \varphi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_1) = (5,2267 - 8,867) * 0,0020 + 1,265 * 0,0063 = 0,000764$$

Iterasi 2 retailer Singosari

1. Menghitung nilai Q baru dengan menggunakan nilai ($\eta(r)$) yang diperoleh dari langkah ke-5.

$$Q = \sqrt{\frac{2\lambda(A + \pi \eta(r_1))}{h}}$$

$$Q_2 = \sqrt{\frac{2 * 1568,01(97,4 + 2250 * 0,000764)}{160}} = 44,0766$$

2. Menghitung $F(r_2)$

$$F(r_2) = \phi \frac{r - \mu_L}{\sigma_L} = \frac{h Q_2}{h Q_2 + \pi \lambda}$$

$$F(r_2) = \frac{160 * 44,0766}{160 * 44,0766 + 2350 * 443,64} = 0,002$$

3. Perhitungan nilai r_2 :

$$F(r_2) = 0,002 \rightarrow \text{(tabel } Z = 2,88)$$

$$Z = \frac{r_2 - \mu_L}{\sigma_L}$$

$$r_2 = (Z\sigma_L) + \mu_L$$

$$r_2 = (2,88 * 1,265) + 5,2267$$

$$= 8,867$$

4. Koordinat distribusi normal :

$$\phi \frac{r - \mu_L}{\sigma_L}$$

$$Z = 2,88 \rightarrow 0,0063$$

5. Perbandingan r_1 dan r_2 :

$$r_2 \geq r_1 ?$$

$$8,867 \geq 8,867, \text{ (sesuai syarat)}$$

6. Harga r disubstitusikan ke persamaan berikut untuk mendapatkan harga ekspektasi jumlah kekurangan produk.

$$\eta(r_2) = (\mu_L - r_2) \phi \frac{r_2 - \mu_L}{\sigma_L} + \sigma_L * \phi \frac{r - \mu_L}{\sigma_L}$$

$$\eta(r_2) = (5,2267 - 8,867) * 0,0020 + 1,265 * 0,0063 = \mathbf{0,000701}$$

Tabel E.1

Rangkuman Perhitungan Kekurangan Barang untuk Kasus *Lost Sales*

| No. | RETAILER | Mj |
|-----|-------------|----------|
| 1 | Batujajar | 0,000225 |
| 2 | Cicadas | 0,000297 |
| 3 | Cihanjuang | 0,000577 |
| 4 | Kopo 373 | 0,000658 |
| 5 | Kordon | 0,000182 |
| 6 | Lewipanjang | 0,000308 |
| 7 | M.Ramdan | 0,000571 |
| 8 | Pagarsih | 0,000379 |
| 9 | Sarimanah | 0,000725 |
| 10 | Singosari | 0,000701 |

TARIF TELEPON

- Tarif jasa telpon berdasarkan ketentuan PT.Telekomunikasi Indonesia, Tbk berlaku mulai per 8 April 2008 adalah sebagai berikut :

Tabel E.1
Tarif Abodemen/Bulanan Pelanggan Bisnis, Residensial dan Sosial

| Golongan Tarif | Bisnis (Rp) | Residensial (Rp) | Sosial (Rp) |
|-----------------------|--------------------|-------------------------|--------------------|
| I | 57600 | 32600 | 18500 |
| II | 48100 | 28700 | 15500 |
| III | 48100 | 28700 | 15500 |
| IV | 38400 | 20600 | 12500 |
| V | 38400 | 20600 | 12500 |

Perusahaan PT Panfila Indosari dan PT Yomart Rukun Selalu termasuk golongan tarif I bisnis dengan biaya abodemen Rp 57.600.

Tabel E.2
Tarif Penggunaan TELKOM lokal per pulsa termasuk hari Raya dan Hari Libur Nasional

| Jarak (Km) | Time Band | Tarif per Pulsa (Rp) | Durasi (Pembulatan) | Pembebanan (Rp/menit) |
|---------------------|------------------|-----------------------------|----------------------------|------------------------------|
| 0 s/d 20 Lokal 1 | 00.00-09.00 | 250 | 3 menit | 250/3 menit |
| | 09.00-15.00 | 250 | 2 menit | 250/2 menit |
| | 15.00-24.00 | 250 | 3 menit | 250/3 menit |
| > 20 Lokal 2 | 00.00-09.00 | 250 | 2 menit | 250/2 menit |
| | 09.00-15.00 | 250 | 1,5 menit | 250/1,5 menit |
| | 15.00-24.00 | 250 | 2 menit | 250/2 menit |

Tarif telepon yang dilakukan *Distributor Center* ke Produsen termasuk jarak lokal 2, pembicaraan dilakukan pada pukul 09.00-15.00 rata-rata selama 6 menit.

Tarif telepon yang dilakukan *Retailer* ke *Distributor Center* termasuk jarak lokal 1, pembicaraan dilakukan pada pukul 09.00-15.00 rata-rata selama 6 menit

Tabel E.3
Biro Jasa Birofax Dalam Negeri

| ZONE | JARAK (KM) | TARIF (Rp) | |
|-------|---------------|------------|--------|
| | | TEXT | GAMBAR |
| LOKAL | 0 s/d 30 | 1.175 | 2350 |
| I | >30 s/d 200 | 1925 | 3850 |
| II | >200 s/ 500 | 2725 | 5450 |
| III | > 500 | 3400 | 6800 |

Keterangan : Tarif pengunjukan Birofax sebesar Rp 500

TARIF LISTRIK

Tarif listrik untuk industri, ditunjukkan pada tabel di bawah ini:

Tabel E.4
Tarif Listrik Untuk Industri

| No. | GOL. TARIF | BATAS DAYA | BIAYA BEBAN (Rp/Kva/bulan) | BIAYA PEMAKAIAN (Rp/kWh) |
|----------|---------------|------------------------------------|--------------------------------|--|
| | | | 1 Januari s.d 31 Desember 2004 | 1 Januari s.d 31 Desember 2004 |
| 1 | I-1/TR | s.d 450 VA | 26.000 | Blok I : 0 s.d. 30 kWh : 160 Blok II : di atas 30 kWh : 395 |
| 2 | I-1/TR | 900 VA | 31.500 | Blok I : 0 s.d. 72 kWh : 315 Blok II : di atas 72 kWh : 405 |
| 3 | I-1/TR | 1300 VA | 31.800 | Blok I : 0 s.d. 104 kWh : 450 Blok II : di atas 104 kWh : 460 |
| 4 | I-1/TR | 2200 VA | 32.000 | Blok I : 0 s.d. 196 kWh : 455 Blok II : di atas 196 kWh : 460 |
| 5 | I-1/TR | di atas 2200 VA s.d 14 kVA | 32.200 | Blok I : 0 s.d. 80 jam nyala : 455 Blok II : di atas 80 jam nyala berikutnya : 460 |
| 6 | I-2/TR | di atas 14 kVA s.d. 200 kVA | 32.500 | Blok WBP = K x 440 Blok LWBP = 440 |
| 7 | I-3/TM | di atas 200 kVA | 29.500 | 0 s.d. 350 jam nyala, Blok WBP = K x 439 di atas 350 jam nyala, Blok WBP = 439 Blok LWBP = 439 |
| 8 | I-4/TT | 30000 kVA ke atas | 27.000 | 434 |

Catatan :

K : Faktor perbandingan antara harga WBP dan LWBP sesuai dengan karakteristik beban sistem kelistrikan setempat ($1,4 < K < 2$), yang ditetapkan oleh Direksi Perusahaan Perseroan (PERSERO) PT Perusahaan Listrik Negara.

WBP : Waktu Beban Puncak

LWBP : Luar Waktu Beban Puncak

Jam nyala : adalah kWh per bulan dibagi dengan kVA tersambung

PT Panfila Indosari memiliki kapasitas daya sebesar 120kVA dengan demikian termasuk Industri menengah golongan tarif I-2.

Tarif listrik untuk keperluan bisnis, ditunjukkan pada tabel di bawah ini:

Tabel E.5
Tarif Listrik Untuk Keperluan Bisnis

| LAMPIRAN IV KEPUTUSAN PRESIDEN REPUBLIK INDONESIA NOMOR : 104 TAHUN 2003 TANGGAL : 31 DESEMBER 2003 | | | | |
|--|------------|----------------------|----------------------------------|--|
| TARIF DASAR LISTRIK UNTUK KEPERLUAN BISNIS | | | | |
| NO. | GOL. TARIF | BATAS DAYA | BIAYA BEBAN (Rp/ kVA / bulan) | BIAYA PEMAKAIAN (Rp/kWh) |
| | | | 1 Jan - 31 Des 2004 | 1 Januari s.d 31 Desember 2004 |
| 1. | B-1/TR | s.d. 450 VA | 23.500 | Blok I : 0- 30 kWh : 254 Blok II : > 30 kWh : 420 |
| 2. | B-1/TR | 900 VA | 26.500 | Blok I : 0- 108 kWh : 420 Blok II : > 108 kWh : 465 |
| 3. | B-1/TR | 1.300 VA | 28.200 | Blok I : 0- 146 kWh : 470 Blok II : > 146 kWh : 473 |
| 4. | B-1/TR | 2.200 VA | 29.200 | Blok I : 0- 264 kWh : 480 Blok II : > 264 kWh : 518 |
| 5. | B-2/TR | 2.200 VA- 200 KVA | 30.000 | Blok I : 0- 100 jam nyala : 520 Blok II : >100 jam nyala berikutnya : 545 |
| 6. | B-3/TM | di atas 200 kVA | 28.400 | Blok WBP = $K \times 452$ Blok LWBP = 452 |
| <p>K : Faktor perbandingan antara harga WBP dan LWBP sesuai dengan karakteristik beban sistem tenaga listrik setempat ($1,4 < K < 2$), yang ditetapkan oleh Direksi Perusahaan Perseroan (PERSERO) PT Perusahaan Listrik Negara.</p> <p>WBP : Waktu Beban Puncak</p> <p>LWBP : Luar Waktu Beban Puncak</p> <p>Jam nyala : adalah kWh per bulan dibagi dengan kVA tersambung</p> | | | | |

PT Yomart Rukun Selalu memiliki kapasitas daya sebesar 13kVA dengan demikian termasuk keperluan bisnis golongan tarif B-2.

KOMENTAR DOSEN PENGUJI

Nama Mahasiswa 1 : Anton Febri

NRP : 0623018

Nama Mahasiswa 2 : Anna Siefan

NRP : 0623041

Judul Tugas Akhir : USULAN PENGENDALIAN PERSEDIAAN PRODUK
RON88 DENGAN MENGGUNAKAN METODE
MULTI ESELON DI PT. YOMART RUKUN SELALU

Komentar-komentar Dosen Penguji :

1. Pahami dengan sungguh-sungguh falsafah teori yang anda pelajari dan hayati agar anda dapat memakai dan menerapkan teori pada situasi khusus yang dihadapi.
2. Perbaiki tata kalimat dan salah ketik
3. Cek format penulisan TA
4. Cek konsistensi
5. Masalah pada abstrak ada empat, dalam penelitian (dianalisis dan kesimpulan) harus ada pembahasan dan penyelesaiannya

DATA PENULIS 1

Nama : Anton Febri
Alamat di Bandung : Jl. Terusan Babakan Jeruk 1 no. 11
Alamat asal : Jl. Segaran no.1143, Palembang
No. Handphone : 08172384342
Alamat email : shake_val2003@yahoo.com
Pendidikan : SMA Xaverius 3, Palembang
Jurusan Teknik Industri Universitas Kristen Maranatha
Nilai Tugas Akhir : A
Tanggal USTA : 29 Juli 2010

DATA PENULIS 2

Nama : Anna Siefan
Alamat di Bandung : Permata Cimahi blok V5 no.11
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Pendidikan : SMUK 1 BPK Penabur Bandung
Jurusan Teknik Industri Universitas Kristen Maranatha
Nilai Tugas Akhir : A
Tanggal USTA : 29 Juli 2010