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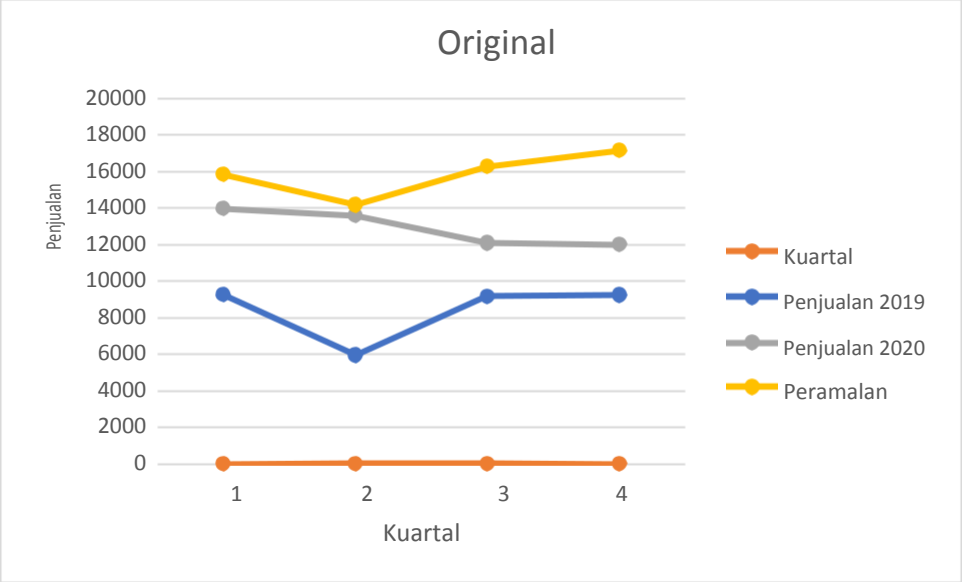
Lampiran 1

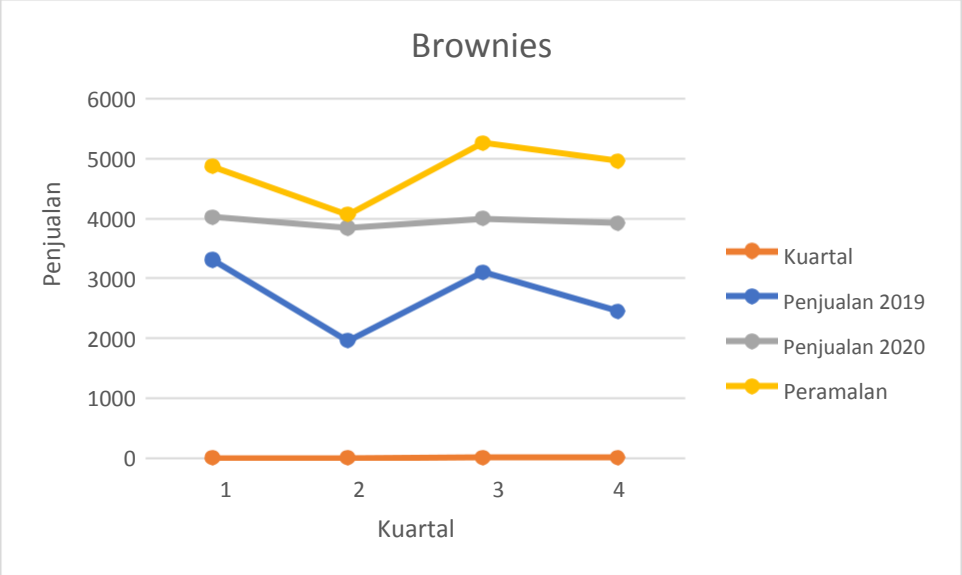
Data penjualan

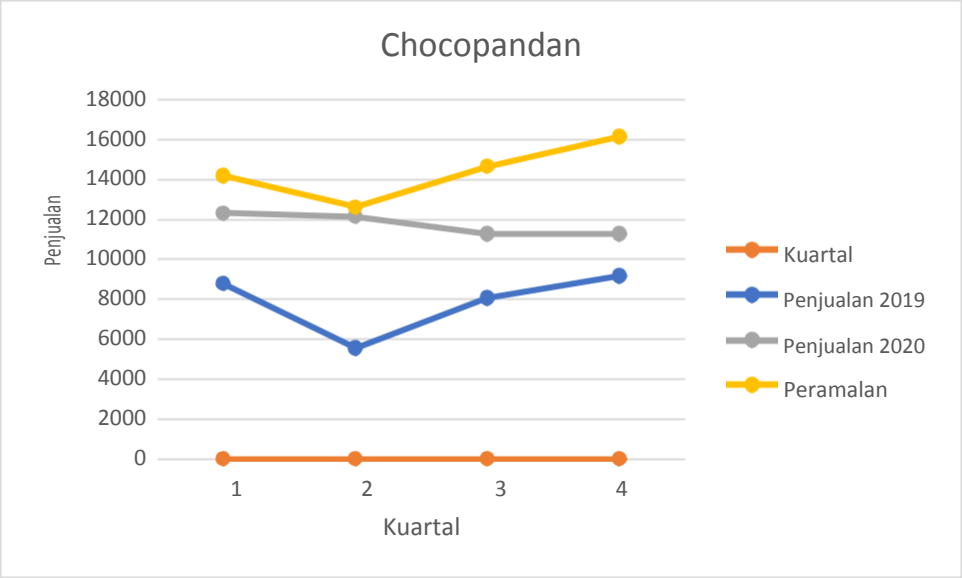
| Tahun | Bulan | Penjualan | | | |
|---|---|---|---|---|---|
| | | Original | Brownies | Chocopandan | Terang Bulan |
| 2018 | 10 | 3,012 | 980 | 2,396 | 478 |
| | 11 | 3,031 | 1,011 | 2,570 | 428 |
| | 12 | 3,310 | 1,044 | 2,787 | 481 |
| 2019 | 1 | 3,354 | 1,125 | 3,174 | 512 |
| | 2 | 3,014 | 1,105 | 2,914 | 526 |
| | 3 | 2,883 | 1,077 | 2,694 | 428 |
| | 4 | 1,657 | 557 | 1,590 | 236 |
| | 5 | 1,714 | 545 | 1,574 | 258 |
| | 6 | 2,584 | 856 | 2,373 | 373 |
| | 7 | 2,799 | 999 | 2,496 | 422 |
| | 8 | 3,721 | 1,154 | 3,038 | 443 |
| | 9 | 2,643 | 946 | 2,532 | 360 |
| | 10 | 2,871 | 841 | 2,875 | 341 |
| | 11 | 2,923 | 688 | 2,965 | 336 |
| | 12 | 3,442 | 917 | 3,332 | 395 |
| 2020 | 1 | 4,780 | 1,381 | 4,310 | 724 |
| | 2 | 4,270 | 1,245 | 3,965 | 650 |
| | 3 | 4,925 | 1,394 | 4,025 | 746 |
| | 4 | 4,650 | 1,345 | 4,115 | 725 |
| | 5 | 3,415 | 926 | 3,182 | 620 |
| | 6 | 5,515 | 1,566 | 4,845 | 740 |
| | 7 | 4,130 | 1,320 | 4,075 | 810 |
| | 8 | 4,300 | 1,450 | 3,850 | 682 |
| | 9 | 3,651 | 1,230 | 3,346 | 581 |
| | 10 | 3,615 | 1.318 | 3,450 | 643 |
| | 11 | 3,650 | 1,240 | 3,550 | 560 |
| | 12 | 4,735 | 1,358 | 4,265 | 705 |
| 2021 | 1 | 4,898 | 1,544 | 4,414 | 836 |
| | 2 | 5,078 | 1,477 | 4,776 | 876 |
| | 3 | 5,188 | 1,643 | 4,956 | 855 |
| | 4 | 5,464 | 1,694 | 4,845 | 821 |

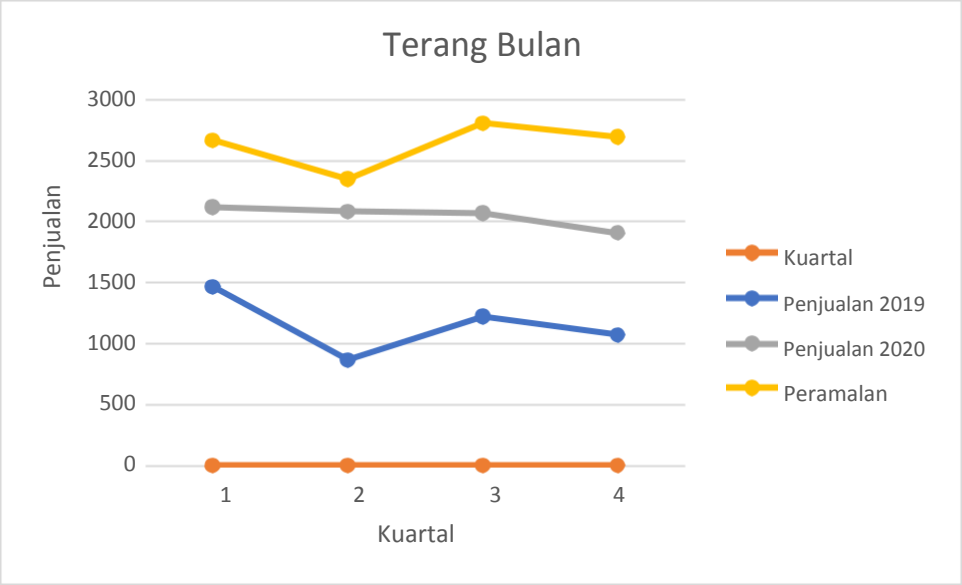
Lampiran 2

Diagram Scatter Plot Data Penjualan




Chocopandan
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Penjualan
1
2
3
4
Kuartal
Kuartal
Penjualan 2019
Penjualan 2020
Peramalan


Terang Bulan
3000
2500
2000
1500
1000
500
0
Penjualan
1
2
3
4
Kuartal
Kuartal
Penjualan 2019
Penjualan 2020
Peramalan

Lampiran 3

Validasi

| TAHUN | KUARTAL | Penjualan | | | |
|---|---|---|---|---|---|
| | | **Original** | **Brownies** | **Chocopandan** | **Terang Bulan** |
| 2021 | 1 | 15,164 | 4,664 | 14,146 | 2,567 |
| Permintaan | 1 | 15,846 | 4,868 | 14,175 | 2,667 |

Perhitungan Harga selisih data asli dengan data hasil ramalan

$$\text{Harga selisih} = \frac{\text{data ramalan} - \text{data asli}}{\text{data asli}} \times 100\%$$

$$\text{Original} = \frac{15846 - 15164}{15164} \times 100\% = 4{,}5\%$$

$$\text{Brownies} = \frac{4868 - 4664}{4664} \times 100\% = 4{,}4\%$$

$$\text{Chocopandan} = \frac{14175 - 14146}{14146} \times 100\% = 0{,}2\%$$

$$\text{Terang Bulan} = \frac{2667 - 2567}{2567} \times 100\% = 3{,}9\%$$

Tingkat kesalahan pada kuartal 1 untuk untuk roti jenis Original = 4,5%, Brownies = 4,4%, Chocopandan = 0,2%, Terang Bulan = 3,9%. Tingkat kesalahan di atas kurang dari 5%, sehingga dapat disimpulkan bahwa data antara hasil ramalan dengan data asli hanya ada sedikit perbedaan, maka metode Trend Musiman dapat digunakan untuk meramalkan jumlah penjualan roti pada masa mendatang. Akurasi suatu peramalan berbeda untuk setiap peramalan dan bergantung pada berbagai faktor, yang jelas tidak akan diperoleh akurasi 100%. Dengan tingkat kesalahan kurang dari 5%, artinya tingkat ketelitian peramalan tersebut sudah lebih dari 95% sehingga hasilnya dapat dikatakan sudah cukup akurat.

Lampiran 4

Hasil Perhitungan POM for Windows

Kuartal 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | X1 | X2 | X3 | X4 | | RHS | Equation form |
| Maximize | 4500 | 4500 | 5000 | 5000 | | | Max 4500X1 + 4500X2 + 5000X3 + 5000X4 |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 1000X1 + 1500X2 + 1200X3 + 1500X4 <= 4.5E+07 |
| b | 1 | 0 | 0 | 0 | <= | 15846 | X1 <= 15846 |
| c | 0 | 1 | 0 | 0 | <= | 4868 | X2 <= 4868 |
| d | 0 | 0 | 1 | 0 | <= | 14175 | X3 <= 14175 |
| e | 0 | 0 | 0 | 1 | <= | 2667 | X4 <= 2667 |

Iterations

| Cj | Basic Variables | 4500 X1 | 4500 X2 | 5000 X3 | 5000 X4 | 0 slack 1 | 0 slack 2 | 0 slack 3 | 0 slack 4 | 0 slack 5 | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iteration 1 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 1,200 | 1,500 | 1 | 0 | 0 | 0 | 0 | 45,000,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 15,846 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,868 |
| 0 | slack 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,175 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,667 |
| | zj | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | cj-zj | 4,500 | 4,500 | 5,000 | 5,000 | 0 | 0 | 0 | 0 | 0 | |
| Iteration 2 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 1,500 | 1 | 0 | 0 | -1,200 | 0 | 27,990,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 15,846 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,868 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,175 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,667 |
| | zj | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 5000 | 0 | 70,875,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 5,000 | 0 | 0 | 0 | -5,000 | 0 | |
| Iteration 3 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 0 | 1 | 0 | 0 | -1,200 | -1,500 | 23,989,500 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 15,846 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,868 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,175 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,667 |
| | zj | 0 | 0 | 5000 | 5000 | 0 | 0 | 0 | 5000 | 5000 | 84,210,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 0 | 0 | 0 | 0 | -5,000 | -5,000 | |
| Iteration 4 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 1,500 | 0 | 0 | 1 | -1,000 | 0 | -1,200 | -1,500 | 8,143,500 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 15,846 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,868 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,175 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,667 |
| | zj | 4500 | 0 | 5000 | 5000 | 0 | 4500 | 0 | 5000 | 5000 | |
| | cj-zj | 0 | 4,500 | 0 | 0 | 0 | -4,500 | 0 | -5,000 | -5,000 | |
| Iteration 5 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 0 | 0 | 0 | 1 | -1,000 | -1,500 | -1,200 | -1,500 | 841,500 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 15,846 |
| 4500 | X2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,868 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,175 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,667 |
| | zj | 4500 | 4500 | 5000 | 5000 | 0 | 4500 | 4500 | 5000 | 5000 | |
| | cj-zj | 0 | 0 | 0 | 0 | 0 | -4,500 | -4,500 | -5,000 | -5,000 | |

Linear Programing Results

| | X1 | X2 | X3 | X4 | | RHS | Dual |
|---|---|---|---|---|---|---|---|
| Maximize | 4500 | 4500 | 5000 | 5000 | | | |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 0 |
| b | 1 | 0 | 0 | 0 | <= | 15846 | 4500 |
| c | 0 | 1 | 0 | 0 | <= | 4868 | 4500 |
| d | 0 | 0 | 1 | 0 | <= | 14175 | 5000 |
| e | 0 | 0 | 0 | 1 | <= | 2667 | 5000 |
| Solution-> | 15846 | 4868 | 14175 | 2667 | | 177423000 | |

Kuartal 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | X1 | X2 | X3 | X4 | | RHS | Equation form |
| Maximize | 4500 | 4500 | 5000 | 5000 | | | Max 4500X1 + 4500X2 + 5000X3 + 5000X4 |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 1000X1 + 1500X2 + 1200X3 + 1500X4 <= 4.5E+07 |
| b | 1 | 0 | 0 | 0 | <= | 14174 | X1 <= 14174 |
| c | 0 | 1 | 0 | 0 | <= | 4063 | X2 <= 4063 |
| d | 0 | 0 | 1 | 0 | <= | 12605 | X3 <= 12605 |
| e | 0 | 0 | 0 | 1 | <= | 2350 | X4 <= 2350 |

Iterations

| Cj | Basic Variables | 4500 X1 | 4500 X2 | 5000 X3 | 5000 X4 | 0 slack 1 | 0 slack 2 | 0 slack 3 | 0 slack 4 | 0 slack 5 | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iteration 1 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 1,200 | 1,500 | 1 | 0 | 0 | 0 | 0 | 45,000,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14,174 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,063 |
| 0 | slack 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12,605 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,350 |
| | zj | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | cj-zj | 4,500 | 4,500 | 5,000 | 5,000 | 0 | 0 | 0 | 0 | 0 | |
| Iteration 2 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 1,500 | 1 | 0 | 0 | -1,200 | 0 | 29,874,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14,174 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,063 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12,605 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,350 |
| | zj | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 5000 | 0 | 63,025,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 5,000 | 0 | 0 | 0 | -5,000 | 0 | |
| Iteration 3 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 0 | 1 | 0 | 0 | -1,200 | -1,500 | 26,349,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14,174 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,063 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12,605 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,350 |
| | zj | 0 | 0 | 5000 | 5000 | 0 | 0 | 0 | 5000 | 5000 | 74,775,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 0 | 0 | 0 | 0 | -5,000 | -5,000 | |
| Iteration 4 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 1,500 | 0 | 0 | 1 | -1,000 | 0 | -1,200 | -1,500 | 12,175,000 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14,174 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,063 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12,605 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,350 |
| | zj | 4500 | 0 | 5000 | 5000 | 0 | 4500 | 0 | 5000 | 5000 | |
| | cj-zj | 0 | 4,500 | 0 | 0 | 0 | -4,500 | 0 | -5,000 | -5,000 | |
| Iteration 5 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 0 | 0 | 0 | 1 | -1,000 | -1,500 | -1,200 | -1,500 | 6,080,500 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14,174 |
| 4500 | X2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,063 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 12,605 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,350 |
| | zj | 4500 | 4500 | 5000 | 5000 | 0 | 4500 | 4500 | 5000 | 5000 | |

Linear Programing Results

| | X1 | X2 | X3 | X4 | | RHS | Dual |
|---|---|---|---|---|---|---|---|
| Maximize | 4500 | 4500 | 5000 | 5000 | | | |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 0 |
| b | 1 | 0 | 0 | 0 | <= | 14174 | 4500 |
| c | 0 | 1 | 0 | 0 | <= | 4063 | 4500 |
| d | 0 | 0 | 1 | 0 | <= | 12605 | 5000 |
| e | 0 | 0 | 0 | 1 | <= | 2350 | 5000 |
| Solution-> | 14174 | 4063 | 12605 | 2350 | | 156841500 | |

Kuartal 3

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | X1 | X2 | X3 | X4 | | RHS | Equation form |
| Maximize | 4500 | 4500 | 5000 | 5000 | | | Max 4500X1 + 4500X2 + 5000X3 + 5000X4 |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 1000X1 + 1500X2 + 1200X3 + 1500X4 <= 4.5E+07 |
| b | 1 | 0 | 0 | 0 | <= | 16276 | X1 <= 16276 |
| c | 0 | 1 | 0 | 0 | <= | 5259 | X2 <= 5259 |
| d | 0 | 0 | 1 | 0 | <= | 14467 | X3 <= 14467 |
| e | 0 | 0 | 0 | 1 | <= | 2809 | X4 <= 2809 |

Iterations

| Cj | Basic Variables | 4500 X1 | 4500 X2 | 5000 X3 | 5000 X4 | 0 slack 1 | 0 slack 2 | 0 slack 3 | 0 slack 4 | 0 slack 5 | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iteration 1 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 1,200 | 1,500 | 1 | 0 | 0 | 0 | 0 | 45,000,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 16,276 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5,259 |
| 0 | slack 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,467 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,809 |
| | zj | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | cj-zj | 4,500 | 4,500 | 5,000 | 5,000 | 0 | 0 | 0 | 0 | 0 | |
| Iteration 2 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 1,500 | 1 | 0 | 0 | -1,200 | 0 | 27,639,600 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 16,276 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5,259 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,467 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,809 |
| | zj | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 5000 | 0 | 72,335,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 5,000 | 0 | 0 | 0 | -5,000 | 0 | |
| Iteration 3 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 0 | 1 | 0 | 0 | -1,200 | -1,500 | 23,426,100 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 16,276 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5,259 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,467 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,809 |
| | zj | 0 | 0 | 5000 | 5000 | 0 | 0 | 0 | 5000 | 5000 | 86,380,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 0 | 0 | 0 | 0 | -5,000 | -5,000 | |
| Iteration 4 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 1,500 | 0 | 0 | 1 | -1,000 | 0 | -1,200 | -1,500 | 7,150,100 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 16,276 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5,259 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,467 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,809 |
| | zj | 4500 | 0 | 5000 | 5000 | 0 | 4500 | 0 | 5000 | 5000 | |
| | cj-zj | 0 | 4,500 | 0 | 0 | 0 | -4,500 | 0 | -5,000 | -5,000 | |
| Iteration 5 | | | | | | | | | | | |
| 4500 | X2 | 0 | 1 | 0 | 0 | 0.0007 | -0.6667 | 0 | -0.8 | -1 | 4,766.7333 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 16,276 |
| 0 | slack 3 | 0 | 0 | 0 | 0 | -0.0007 | 0.6667 | 1 | 0.8 | 1 | 492.2667 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 14,467 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,809 |
| | zj | 4500 | 4500 | 5000 | 5000 | 3 | 1500 | 0 | 1400 | 500 | |
| | cj-zj | 0 | 0 | 0 | 0 | -3 | -1,500.0 | 0 | -1,400.0 | -500 | |

Linear Programing Results

| | X1 | X2 | X3 | X4 | | RHS | Dual |
|---|---|---|---|---|---|---|---|
| Maximize | 4500 | 4500 | 5000 | 5000 | | | |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 3 |
| b | 1 | 0 | 0 | 0 | <= | 16276 | 1500 |
| c | 0 | 1 | 0 | 0 | <= | 5259 | 0 |
| d | 0 | 0 | 1 | 0 | <= | 14467 | 1400 |
| e | 0 | 0 | 0 | 1 | <= | 2809 | 500 |
| Solution-> | 16276 | 4766.733 | 14467 | 2809 | | 181072300 | |

Kuartal 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | X1 | X2 | X3 | X4 | | RHS | Equation form |
| Maximize | 4500 | 4500 | 5000 | 5000 | | | Max 4500X1 + 4500X2 + 5000X3 + 5000X4 |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 1000X1 + 1500X2 + 1200X3 + 1500X4 <= 4.5E+07 |
| b | 1 | 0 | 0 | 0 | <= | 17145 | X1 <= 17145 |
| c | 0 | 1 | 0 | 0 | <= | 4954 | X2 <= 4954 |
| d | 0 | 0 | 1 | 0 | <= | 16140 | X3 <= 16140 |
| e | 0 | 0 | 0 | 1 | <= | 2697 | X4 <= 2697 |

Iterations

| Cj | Basic Variables | 4500 X1 | 4500 X2 | 5000 X3 | 5000 X4 | 0 slack 1 | 0 slack 2 | 0 slack 3 | 0 slack 4 | 0 slack 5 | Quantity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iteration 1 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 1,200 | 1,500 | 1 | 0 | 0 | 0 | 0 | 45,000,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 17,145 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,954 |
| 0 | slack 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 16,140 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,697 |
| | zj | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | cj-zj | 4,500 | 4,500 | 5,000 | 5,000 | 0 | 0 | 0 | 0 | 0 | |
| Iteration 2 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 1,500 | 1 | 0 | 0 | -1,200 | 0 | 25,632,000 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 17,145 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,954 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 16,140 |
| 0 | slack 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,697 |
| | zj | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 5000 | 0 | 80,700,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 5,000 | 0 | 0 | 0 | -5,000 | 0 | |
| Iteration 3 | | | | | | | | | | | |
| 0 | slack 1 | 1,000 | 1,500 | 0 | 0 | 1 | 0 | 0 | -1,200 | -1,500 | 21,586,500 |
| 0 | slack 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 17,145 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,954 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 16,140 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,697 |
| | zj | 0 | 0 | 5000 | 5000 | 0 | 0 | 0 | 5000 | 5000 | 94,185,000 |
| | cj-zj | 4,500 | 4,500 | 0 | 0 | 0 | 0 | 0 | -5,000 | -5,000 | |
| Iteration 4 | | | | | | | | | | | |
| 0 | slack 1 | 0 | 1,500 | 0 | 0 | 1 | -1,000 | 0 | -1,200 | -1,500 | 4,441,500 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 17,145 |
| 0 | slack 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4,954 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 16,140 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,697 |
| | zj | 4500 | 0 | 5000 | 5000 | 0 | 4500 | 0 | 5000 | 5000 | |
| | cj-zj | 0 | 4,500 | 0 | 0 | 0 | -4,500 | 0 | -5,000 | -5,000 | |
| Iteration 5 | | | | | | | | | | | |
| 4500 | X2 | 0 | 1 | 0 | 0 | 0.0007 | -0.6667 | 0 | -0.8 | -1 | 2,961 |
| 4500 | X1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 17,145 |
| 0 | slack 3 | 0 | 0 | 0 | 0 | -0.0007 | 0.6667 | 1 | 0.8 | 1 | 1,993 |
| 5000 | X3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 16,140 |
| 5000 | X4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2,697 |
| | zj | 4500 | 4500 | 5000 | 5000 | 3 | 1500 | 0 | 1400 | 500 | |

Linear Programing Results

| | X1 | X2 | X3 | X4 | | RHS | Dual |
|---|---|---|---|---|---|---|---|
| Maximize | 4500 | 4500 | 5000 | 5000 | | | |
| a | 1000 | 1500 | 1200 | 1500 | <= | 45000000 | 3 |
| b | 1 | 0 | 0 | 0 | <= | 17145 | 1500 |
| c | 0 | 1 | 0 | 0 | <= | 4954 | 0 |
| d | 0 | 0 | 1 | 0 | <= | 16140 | 1400 |
| e | 0 | 0 | 0 | 1 | <= | 2697 | 500 |
| Solution-> | 17145 | 2961 | 16140 | 2697 | | 184662000 | |

Lampiran 3

Berita Acara Bimbingan

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**BERITA ACARA BIMBINGAN SKRIPSI**

Form Skripsi-03

| | |
|---|---|
| Nama | : VIDI TIO PUTRA WAHYUDI |
| NIM | : 173700075 |
| Program Studi | : TEKNIK INDUSTRI |
| Pembimbing | : Drs. Rusdiyantoro. ST., MT. |
| Periode Bimbingan | : ~~Gasal~~/Genap*) Tahun 2020 / 2021 |
| Judul Skripsi | OPTIMASI KEUNTUNGAN BERDASARKAN PERAMALAN TREND MUSIMAN PADA TOKO MITRA LAPIS KUKUS SURABAYA |

**KEGIATAN KONSULTASI / BIMBINGAN**

| No | Tanggal | Materi pembimbingan | Keterangan | Paraf |
|---|---|---|---|---|
| 1 | 17 Maret 2021 | BAB 1. | | |
| 2 | 24 Maret 2021 | BAB 1 | | |
| 3 | 04 April 2021 | BAB 2. | | |
| 4 | 08 April 2021 | BAB 2. | | |
| 5 | 12 April 2021 | BAB 3 | | |
| 6 | 16 April 2021 | BAB 3 | | |
| 7 | 26 April 2021 | BAB 4 | | |
| 8 | 06 Mei 2021 | BAB 4 | | |
| 9 | 19 Mei 2021 | BAB 5 | | |
| 10 | 21 Mei 2021 | Abstrak | | |

**Dinyatakan selesai tanggal : 21 MEI 2021.**

Surabaya, 25 - 05 - 2021

| Mengetahui, Ketua Program Studi | Pembimbing, | Mahasiswa, |
|---|---|---|
| M. Mushron Al Mukhtar, ST, MT. | Drs. Rusdiyantoro, ST, MT. | VIDI TIO PUTRA W. |
| NIDN. 0722108505 | NIDN. 0717106001 | |

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## BERITA ACARA BIMBINGAN SKRIPSI

Form Skripsi-03

| | |
|---|---|
| Nama | : VIDI TIO PUTRA WAHYUDI |
| NIM | : 173700075 |
| Program Studi | : TEKNIK INDUSTRI |
| Pembimbing | : Drs. Rusdiyantoro. ST., MT. |
| Periode Bimbingan | : ~~Gasal~~/Genap*) Tahun 2020 / 2021 |
| Judul Skripsi | OPTIMASI KEUNTUNGAN BERDASARKAN PERAMALAN TREND MUSIMAN PADA TOKO MITRA LAPIS KUKUS SURABAYA |

**KEGIATAN KONSULTASI / BIMBINGAN**

| No | Tanggal | Materi pembimbingan | Keterangan | Paraf |
|---|---|---|---|---|
| 1 | 17 Maret 2021 | BAB 1. | Revisi | |
| 2 | 24 Maret 2021 | BAB 1 | Acc | |
| 3 | 04 April 2021 | BAB 2. | Revisi | |
| 4 | 08 April 2021 | BAB 2. | Acc | |
| 5 | 12 April 2021 | BAB 3 | Revisi | |
| 6 | 16 April 2021 | BAB 3 | Acc | |
| 7 | 26 April 2021 | BAB 4 | Revisi | |
| 8 | 06 Mei 2021 | BAB 4 | Acc | |
| 9 | 19 Mei 2021 | BAB 5 | Acc | |
| 10 | 21 Mei 2021 | Abstrak | Acc | |

**Dinyatakan selesai tanggal : 21 MEI 2021.**

Surabaya, 25 - 05 - 2021

| Mengetahui, Ketua Program Studi | Pembimbing, | Mahasiswa, |
|---|---|---|
| M. Mushron Ali Mukhtar, ST.MT. | Drs. Rusdiyantoro, ST. MT. | VIDI TIO PUTRA W. |
| NIDN. 0722108505 | NIDN. 0717106001 | |

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## BERITA ACARA UJIAN SKRIPSI

Pada

Hari, tanggal : Kamis, 03 Juni 2021
Jam : 08.00
Tempat : Gedung Sardjito H.2 teknik

Telah dilaksanakan Ujian Skripsi:

Nama Mahasiswa : Widi tio putra Wahyudi
NIM : .....
Program Studi : .....
Judul : .....
.....
Bidang Keahlian :
Tanda Tangan : .....

Saran-saran perbaikan :
- Definisi operasional variabel (jangan teori)
- Sebelum Rumus diturunkan tanlah Rumus Aslinya (linier)
- Tidak ada tracking error.

**Tim Penguji**

| Nama | ( Tanda tangan ) |
|---|---|
| 1. Jitro Utomo | ..... |
| 2. ..... | ..... |

*) Jangka waktu perbaikan Skripsi dua minggu setelah ujian.
Apabila waktu tersebut tidak dipenuhi, maka nilai Ujian Skripsi dianggap batal dan mahasiswa yang bersangkutan diwajibkan mengulang Ujian lisan

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## BERITA ACARA UJIAN SKRIPSI

Pada

Hari, tanggal :
Jam :
Tempat :

Telah dilaksanakan Ujian Skripsi:

Nama Mahasiswa : .....
NIM : .....
Program Studi : .....
Judul : .....
.....
Bidang Keahlian :
Tanda Tangan : .....

Saran-saran perbaikan :
- Apa metode peramalan yang dipakai ?
- metode peramalan apakah sesuai dengan kurva permintaan
- % max keliru
- Referensi untuk halaman 8

**Tim Penguji**

| Nama | ( Tanda tangan ) |
|---|---|
| 1. ..... | ..... |
| 2. INDRA D.F. | ..... |

*) Jangka waktu perbaikan Skripsi dua minggu setelah ujian.
Apabila waktu tersebut tidak dipenuhi, maka nilai Ujian Skripsi dianggap batal dan mahasiswa yang bersangkutan diwajibkan mengulang Ujian lisan

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## FORM REVISI SKRIPSI

Nama Mahasiswa : VIDI TIO PUTRA WAHYUDI

NIM : 173700075

Fakultas / Progdi : TEKNIK / TEKNIK INDUSTRI

Judul Skripsi : OPTIMASI KEUNTUNGAN BERDASARKAN PERAMALAN TREND MUSIMAN PADA TOKO MITRA LAPIS KUKUS SURABAYA

Ujian Tanggal :

| No Bab. | Tanggal | Materi Konsultasi | Keterangan Catatan | Tanda Tangan Penguji |
|---|---|---|---|---|
| I | 15-6-2021 | Pembahasan Variabel | Perbaiki | |
| II | 15-6-2021 | Perumusan Masalah | Perbaiki | |
| III | 17-6-2021 | Metode Pengolahan data | ACC | |
| IV | 17-6-2021 | Grafik Regresi | ACC | |
| V | 17-6-2021 | Kesimpulan | ACC | |
| | | | | |

Disetujui Dosen Penguji
Pada Tanggal,.....

Penguji I,

( Jitno Utomo )

Penguji II,

( INDRA DWI FEBRYANTO )

1. a. Penyelesaian Revisi paling lambat 2 minggu dari pelaksanaan Ujian Skripsi.
   b. Pengetikan, penjilidan, penandatangani Skripsi dan mengumpulkan Skrispi paling lambat 2 minggu dari revisi.
2. Apabila sampai batas waktu tersebut ( point 1,a dan b ) mahasiswa belum menyelesaikan revisi dan tanda tangan, maka **Ujian dinyatakan Gugur**.
3. a. Foto copy Form Revisi diserahkan ke Program Studi.
   b. Skripsi yang sudah direvisi diserahkan ke Fakultas tiga eksemplar untuk dijilid.