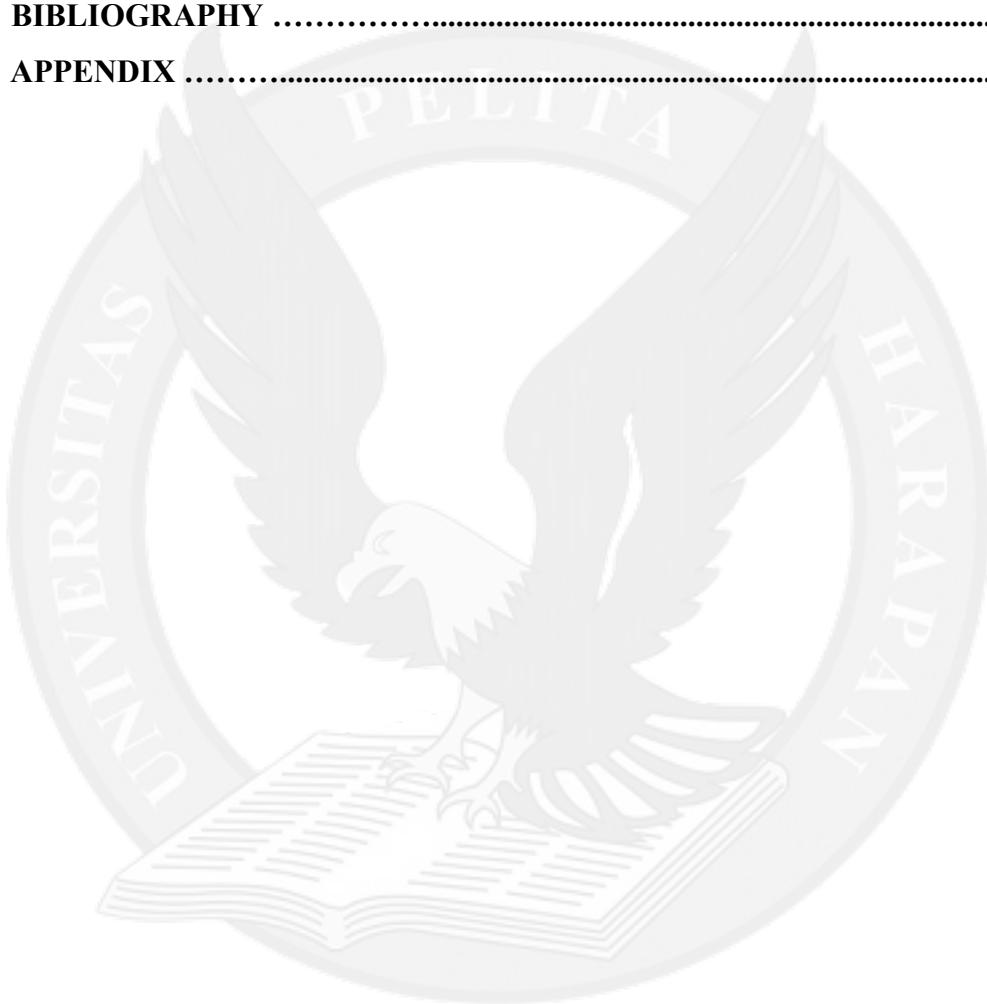


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APPENDIX

Analysis using Python in Google Colab

```
[1] # Forecasting the next 5 years in months
forecast_periods = 5 * 12 # 5 years in months
forecast_start_index = len(df['Date']) - forecast_periods
forecast_end_index = len(df['Date']) + forecast_periods - 1
df['Date'] = df['Date'].dt.strftime('%Y-%m')
for i in range(forecast_start_index, forecast_end_index):
    df.loc[i, 'Date'] = df.loc[i, 'Date'].replace('2021', '2022')

# Remove observations in recent period
trend = df['Sales'].rolling(12).mean().dropna()
seasonal = df['Sales'].rolling(12).mean().dropna()

# Forecast future trend using Exponential Smoothing
trend_model = ExponentialSmoothing(trend, trend='add', seasonal='none').fit()

# Repeat the seasonal component
seasonal_forecast = np.tile(seasonal.values, forecast_periods // 12 + 1) * forecast_periods

# Combine trend and seasonal to create forecast
forecast = trend_model.forecast * seasonal_forecast
forecast_data = pd.DataFrame(forecast, columns=['Sales'])

# Show below output
forecast_data.sample(10).sum()

[2] # Aggregate yearly forecasts
yearly_forecast = forecast_data.groupby('Year').sum()

❶ # Plot the monthly forecasts
plt.figure(figsize=(15, 10))
for product_group in yearly_forecast.columns:
    plt.plot(yearly_forecast[product_group], label=product_group)
    plt.plot(forecast[product_group], label='Monthly Forecast')
    plt.title('Monthly Forecast')
    plt.legend()
    plt.show()
```

Raw Data

Month	Actual Ship date	Family	Sub Family	Spec Code	Product Name	Order Qty (bags)	Destination
Jan-21	4-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	4-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	750	PCI WH Makassar
Jan-21	4-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	250	PCI WH Makassar
Jan-21	4-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE CAT FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	100	PCI WH Makassar
Jan-21	5-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	750	PCI WH Jakarta
Jan-21	5-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	5-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	400	PCI WH Semarang
Jan-21	5-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	200	PCI WH Semarang
Jan-21	5-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	100	PCI WH Semarang
Jan-21	6-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	6-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	300	PCI WH Palembang
Jan-21	6-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	300	PCI WH Palembang
Jan-21	6-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	100	PCI WH Palembang
Jan-21	7-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	7-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	200	PCI WH Bandung
Jan-21	7-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	100	PCI WH Bandung
Jan-21	7-Jan-21	Meo	'5CA01	5CA01201	ME-O CAT FOOD ADULT TUNA FLAVOR 20KG/1	200	PCI WH Bandung
Jan-21	8-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	750	PCI WH Jakarta
Jan-21	8-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	99	PCI WH Bali
Jan-21	8-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	99	PCI WH Bali
Jan-21	8-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	250	PCI WH Bali
Jan-21	8-Jan-21	Meo	'5CA01	5CA01201	ME-O CAT FOOD ADULT TUNA FLAVOR 20KG/1	252	PCI WH Bali
Jan-21	11-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	11-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	750	PCI WH Jakarta
Jan-21	11-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	900	PCI WH Medan
Jan-21	11-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	100	PCI WH Medan
Jan-21	12-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	100	PCI WH Jakarta
Jan-21	12-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	750	PCI WH Jakarta
Jan-21	12-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya
Jan-21	12-Jan-21	Cat Choice	'14CA01	14CA01201	CAT CHOIZE CAT FOOD ADULT TUNA FLAVOR 20KG/1(800Gx25)	350	PCI WH Semarang
Jan-21	12-Jan-21	Cat Choice	'14CA02	14CA02201	CAT CHOIZE CAT FOOD ADULT SALMON FLAVOR 20KG/1(800Gx25)	150	PCI WH Semarang
Jan-21	12-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	100	PCI WH Semarang
Jan-21	12-Jan-21	Meo	'5CA01	5CA01201	ME-O CAT FOOD ADULT TUNA FLAVOR 20KG/1	100	PCI WH Semarang
Jan-21	13-Jan-21	Meo	'5CA01	5CA01201	ME-O CAT FOOD ADULT TUNA FLAVOR 20KG/1	750	PCI WH Jakarta
Jan-21	13-Jan-21	Meo	'5CA01	5CA01201	ME-O CAT FOOD ADULT TUNA FLAVOR 20KG/1	700	PCI WH Surabaya
Jan-21	14-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	750	PCI WH Jakarta
Jan-21	14-Jan-21	Dog Choice	'14DA01	14DA01201	DOG CHOIZE DRY DOG FOOD ADULT BEEF FLAVOR 20KG/1(800Gx25)	700	PCI WH Surabaya