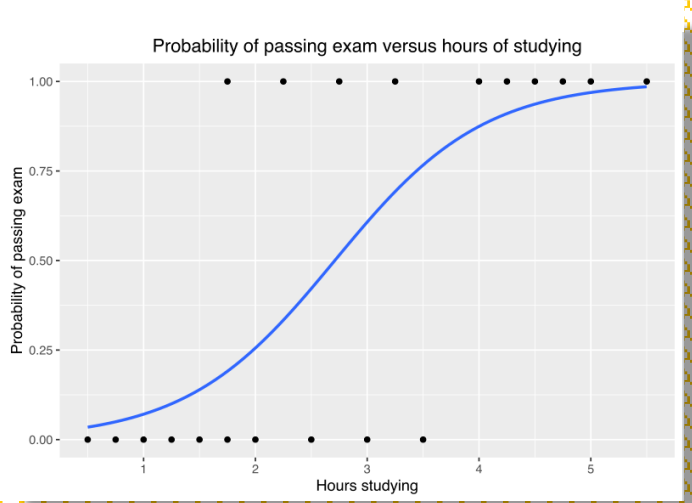
DEMAND FORECASTING

Insights into:

Stock Management and Sales Trends

PROJECT BACK-GROUND



Why this is important:

- **A new hub established in January 2022 needs optimized stock planning.**
- **Stocking issues in previous months led to revenue loss and customer dissatisfaction.**
- **Efficient stock preparation ensures operational success and customer satisfaction.**

PROBLEM STATEMENT

How to forecast demand for August 2022 with ~80% accuracy to prepare stock levels.

OBJECTIVE STATEMENT

To forecast demand for August 2022 with ~80% accuracy.

OBJECTIVE STATEMENT

Identify suitable method for demand forecasting.	*Provide accurate forecast for August 2022.*	*Offer actionable insights and recommendations for stock preparation.*

LINK

DATA SOURCE

forecast	
hub	str
month	date
week	str
category	str
shipped_qty	int

Month	Category	Week	Hub	Shipped Qty
2022-01-01	A. Bahan & Bumbu Masak	W1	A	150.00
2022-01-01	A. Bahan & Bumbu Masak	W2	A	200.00
2022-01-01	A. Bahan & Bumbu Masak	W3	A	250.00
2022-01-01	A. Bahan & Bumbu Masak	W4	A	400.00
2022-01-01	B. Daging Beku	W1	A	150.00
2022-01-01	B. Daging Beku	W2	A	200.00
2022-01-01	B. Daging Beku	W3	A	250.00
2022-01-01	B. Daging Beku	W4	A	400.00
2022-01-01	C. Kebutuhan Pokok	W1	A	165.00
2022-01-01	C. Kebutuhan Pokok	W2	A	220.00
2022-01-01	C. Kebutuhan Pokok	W3	A	275.00
2022-01-01	C. Kebutuhan Pokok	W4	A	440.00

METHODOLOGY

Collection & Cleaning

Gathering and preprocessing historical demand data (Jan–Jul 2022).

Preliminary Analysis

Exploring trends, seasonality, and patterns.

Forecast Analysis

Applying forecasting models and evaluating accuracy.

Insight Generation

Producing actionable insights and recommendations

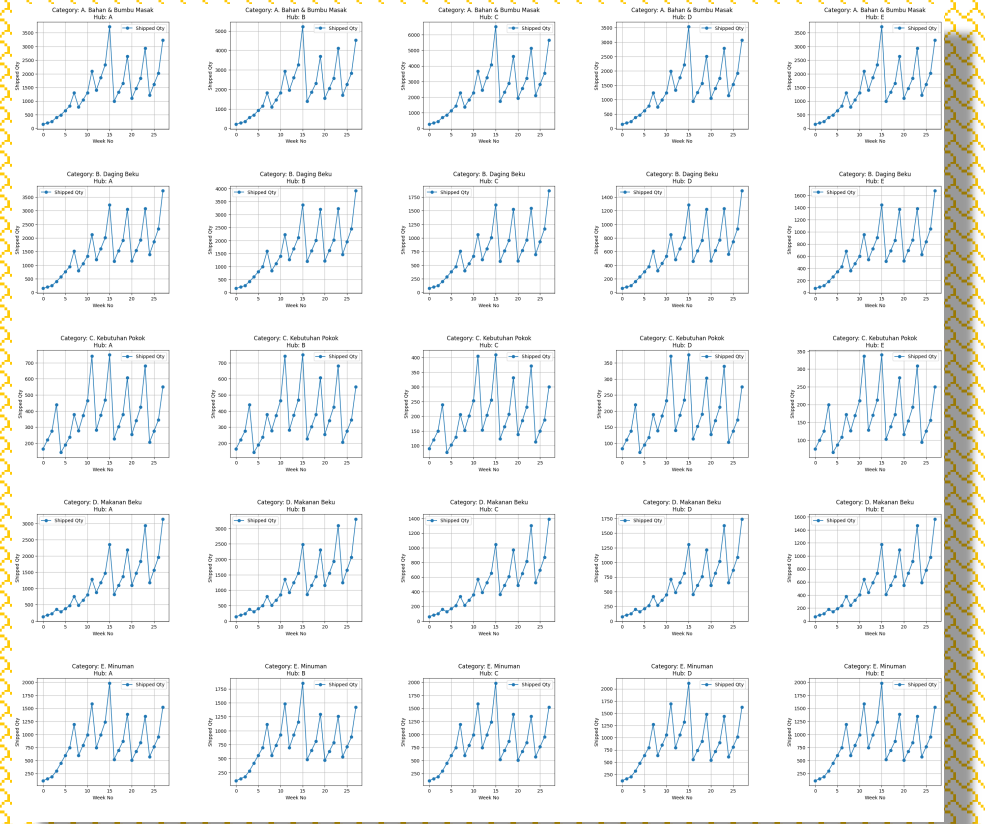
I E P +

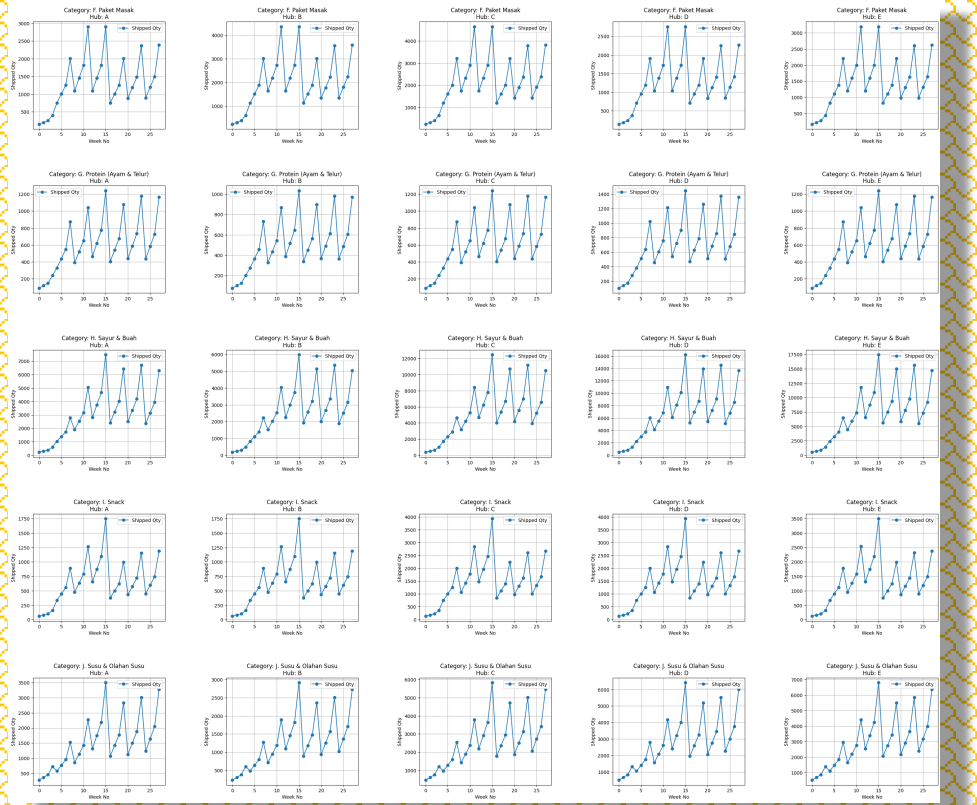
PRELIMINARY ANALYSIS

01 Identifying Pattern

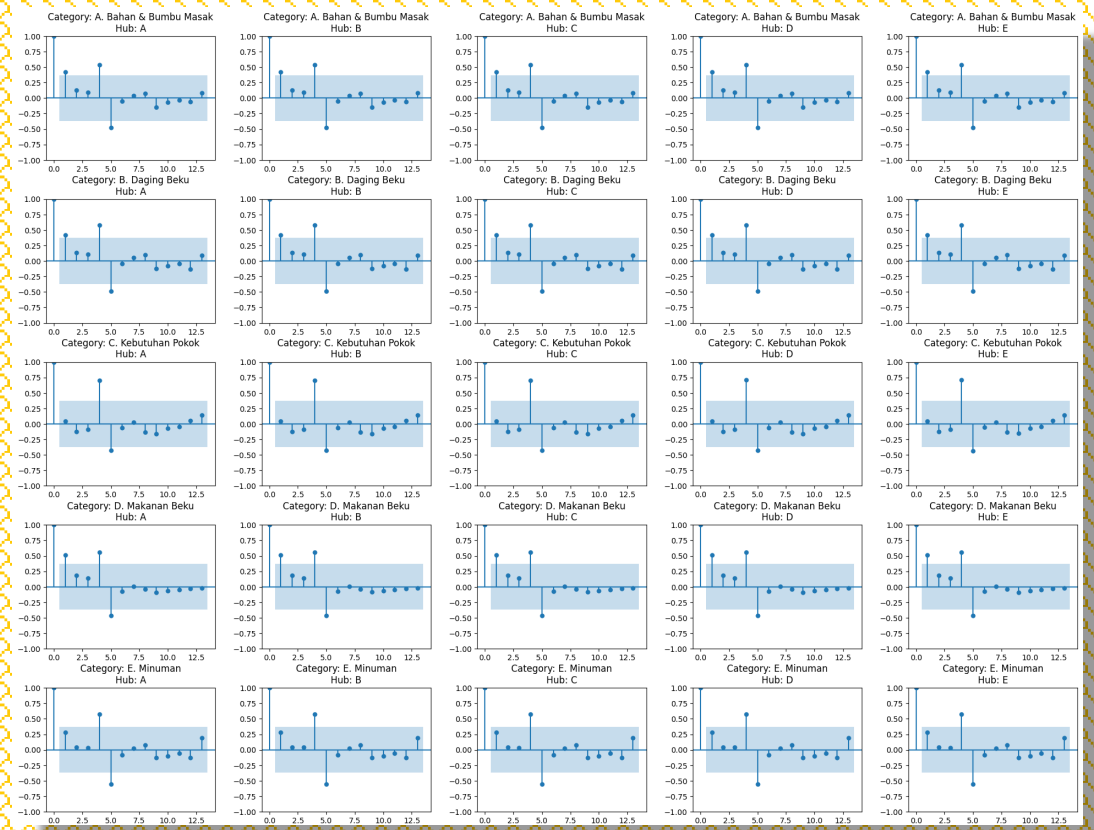
02 Choosing Forecasting Models

IDENTIFYING PATTERN



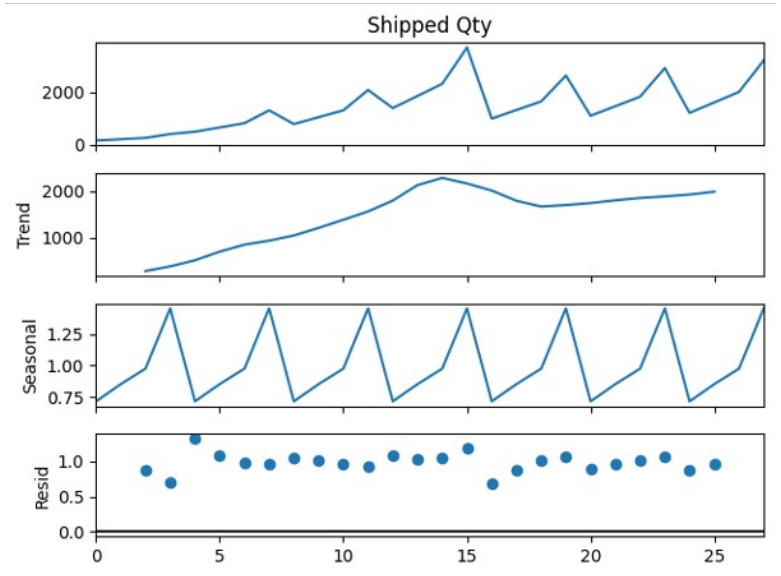


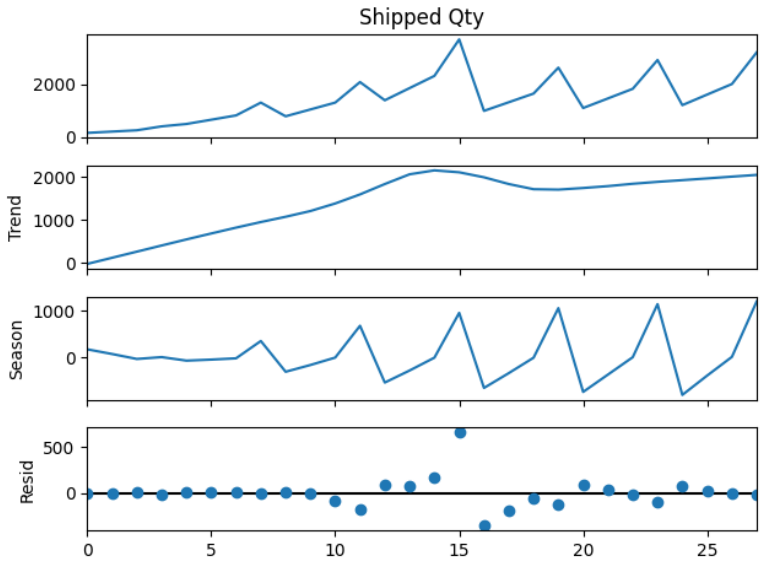
IDENTIFYING PATTERN



CHOOSING FORECASTING MODELS

Checking for Stationarity





index	Hub	Category	ADF Statistic	p-value	Stationarity
0	A	A	-1.8591289762936065	0.3515254884951513	Non-Stationary
1	A	B	-1.8155291829736941	0.3727795949645556	Non-Stationary
2	A	C	-2.030888513367286	0.27319589806664824	Non-Stationary
3	A	D	-0.9729868258418499	0.7629888111650389	Non-Stationary
4	A	E	-2.725483825142892	0.06973131151863751	Non-Stationary
5	A	F	-1.9814548465049462	0.2947632290367733	Non-Stationary
6	A	G	-3.781991116715117	0.0030970381495719103	Stationary
7	A	H	-2.4491790508611877	0.12833413550530126	Non-Stationary
8	A	I	-2.5429290544187495	0.10537545207937754	Non-Stationary
9	A	J	-1.9613138672238661	0.30378885049794024	Non-Stationary
10	B	A	-1.8592303239103412	0.3514766531959193	Non-Stationary
11	B	B	-1.8152676615551333	0.37290850032471384	Non-Stationary
12	B	C	-2.030888513367286	0.27319589806664824	Non-Stationary
13	B	D	-0.9734795465529494	0.7628137335036176	Non-Stationary
14	B	E	-2.7256473695202104	0.06970432936011732	Non-Stationary
15	B	F	-1.9825185604415074	0.2942903085011044	Non-Stationary
16	B	G	-3.7779187549189324	0.003141489207624494	Stationary
17	B	H	-2.4496018802847424	0.12822302423950477	Non-Stationary
18	B	I	-2.5429290544187495	0.10537545207937754	Non-Stationary
19	B	J	-1.9615192492741929	0.3036961398413322	Non-Stationary
20	C	A	-1.8594141914784879	0.3513880618875155	Non-Stationary
21	C	B	-1.8167704129942073	0.3721680072710062	Non-Stationary
22	C	C	-2.0285755003046604	0.2741859641076587	Non-Stationary
23	C	D	-0.9743198620695662	0.7625149480582789	Non-Stationary
24	C	E	-2.725483825142892	0.06973131151863751	Non-Stationary
25	C	F	-1.9821681052782372	0.2944460766564262	Non-Stationary
26	C	G	-3.781991116715117	0.0030970381495719103	Stationary
27	C	H	-2.449452098680847	0.12826237593098072	Non-Stationary
28	C	I	-2.5446804722954286	0.10497799498083832	Non-Stationary
29	C	J	-1.961231716694757	0.303825937577733	Non-Stationary
30	D	A	-1.859423285025082	0.3513836806575651	Non-Stationary
31	D	B	-1.8161287228192438	0.37248413970255057	Non-Stationary
32	D	C	-2.026069194888367	0.27526091833833544	Non-Stationary
33	D	D	-0.9733622488574036	0.762855420469967	Non-Stationary
34	D	E	-2.725908448792189	0.06966127275726898	Non-Stationary
35	D	F	-1.9807695615926078	0.29506810370498315	Non-Stationary
36	D	G	-3.7795922253068515	0.0031231522693956296	Stationary
37	D	H	-2.449494727245967	0.1282511753599745	Non-Stationary
38	D	I	-2.5446804722954286	0.10497799498083832	Non-Stationary
39	D	J	-1.9615294217896793	0.3036915482660242	Non-Stationary
40	E	A	-1.8591289762936065	0.3515254884951513	Non-Stationary
41	E	B	-1.8159362056398372	0.37257900351464474	Non-Stationary
42	E	C	-2.0351756147490323	0.271365895635725	Non-Stationary
43	E	D	-0.9728395021463294	0.7630411428322499	Non-Stationary
44	E	E	-2.725483825142892	0.06973131151863751	Non-Stationary
45	E	F	-1.982463535373633	0.29431476297153314	Non-Stationary
46	E	G	-3.781991116715117	0.0030970381495719103	Stationary
47	E	H	-2.4493529821989815	0.12828842132853163	Non-Stationary
48	E	I	-2.5440595518012645	0.10511877400563324	Non-Stationary
49	E	J	-1.9610378526391266	0.3039134667552951	Non-Stationary

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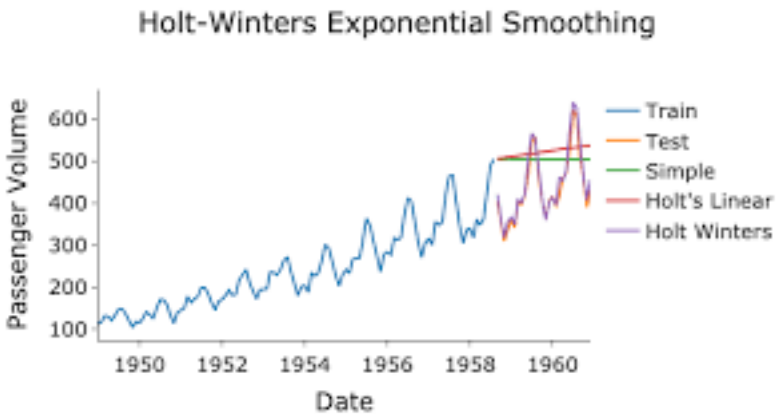
CHOOSING FORECASTING MODELS

For Non-stationer, one of the simplest model is Holt Winter

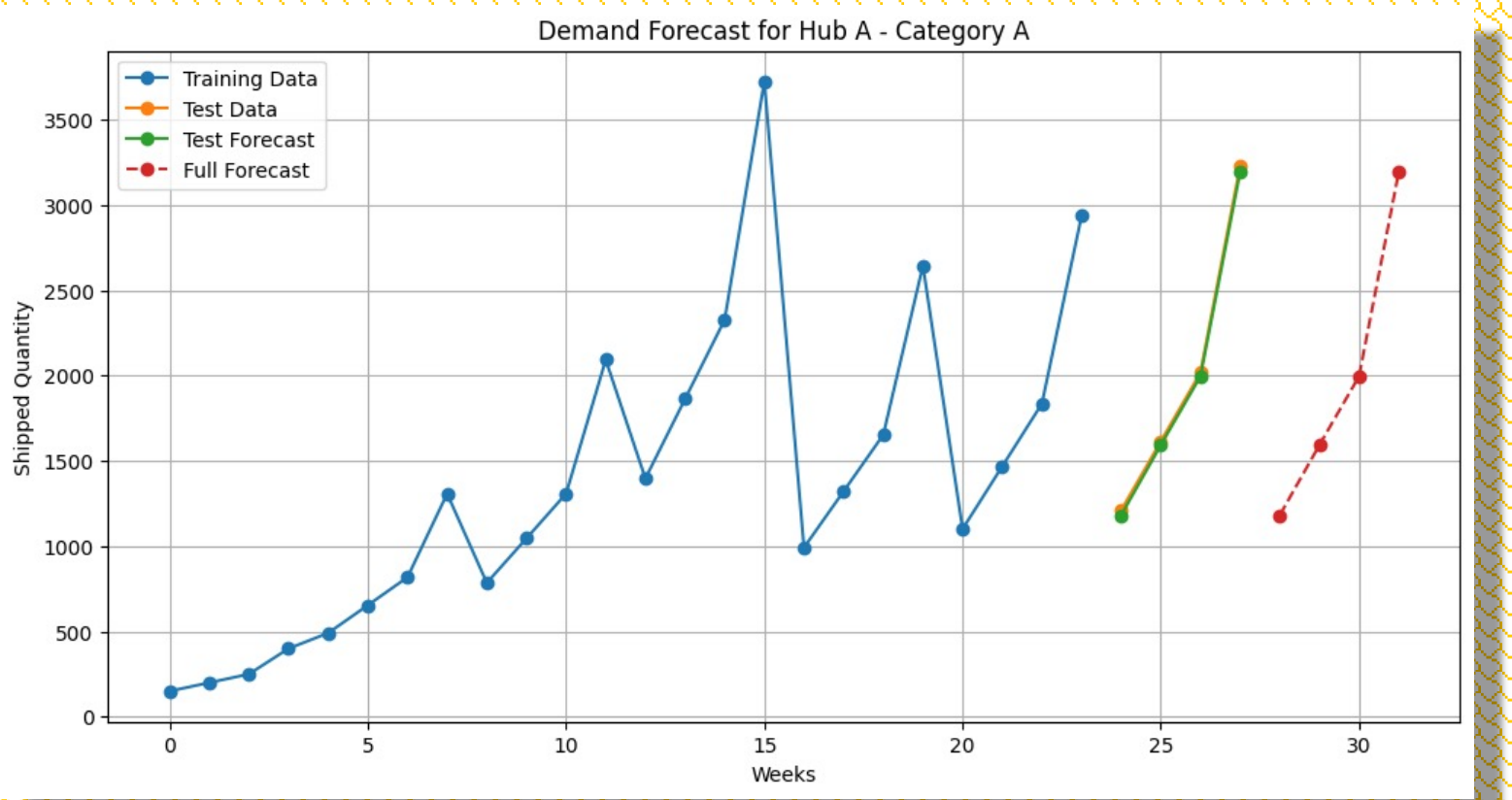


FORECAST ANALYSIS

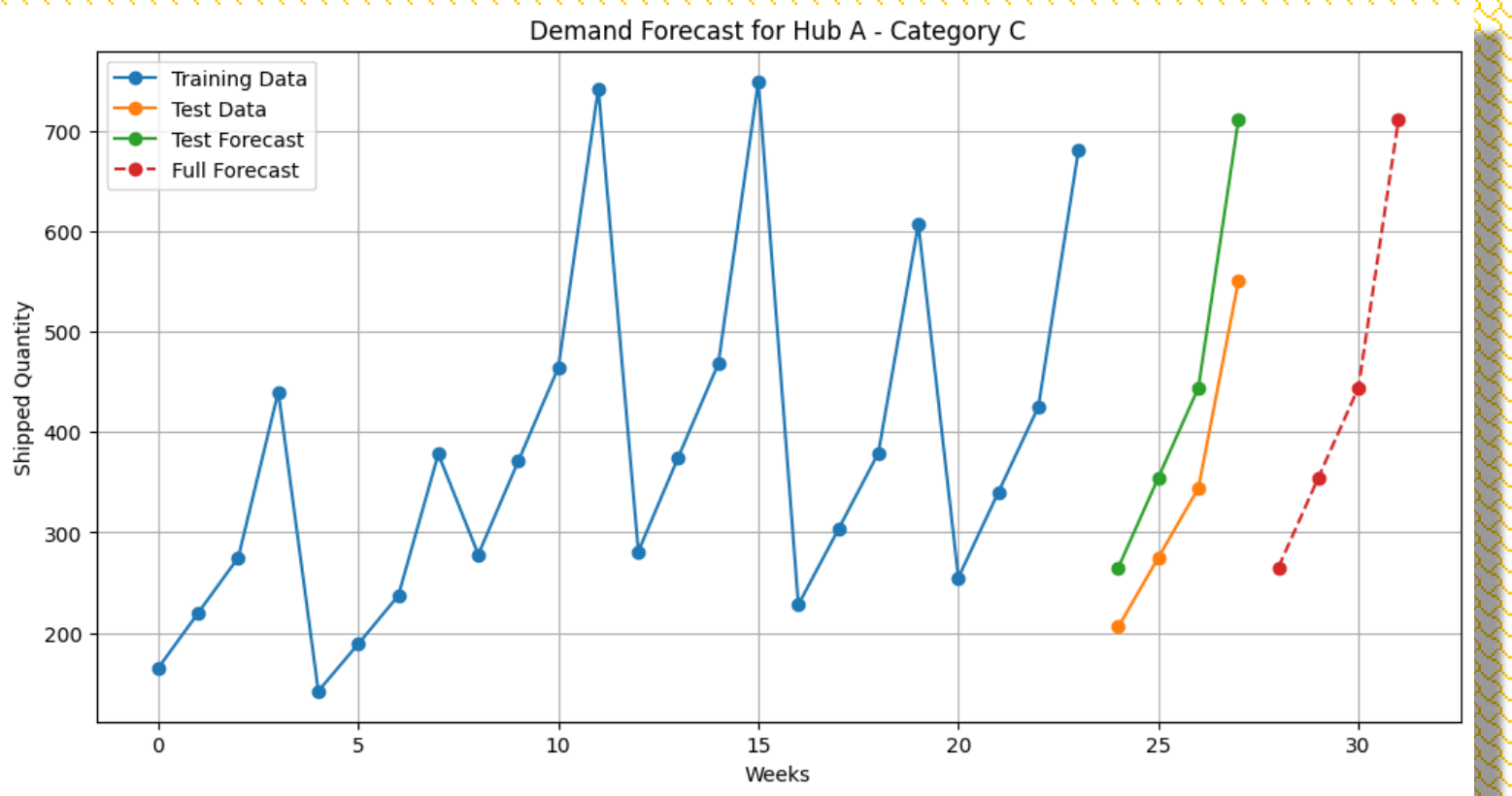
01 Generating Accurate Forecast

02 Evaluation Results

GENERATING ACCURATE FORECAST



GENERATING ACCURATE FORECAST



EVALUATION RESULT

High Percentage Errors (>90% MAPE):

- Categories C, G, and J show consistently high MAPE values across all hubs, highlighting poor model accuracy in relative terms, despite lower absolute error values in some cases.
- Example: Category J in Hub D has a high MAPE of 89.76% even though the MAE is only 668.9.

Moderate Percentage Errors (70%-90% MAPE):

- Categories F, H, and I generally show moderate MAPE values, indicating decent relative performance, particularly for Hub C and D.

Better Percentage Errors (<70% MAPE):

- Only a few cases, such as Category I in Hubs C and D (70.95% and 70.83% MAPE respectively), approach acceptable forecasting accuracy.

WHAT TO DO?

01 Stock Planning

02 Future Forecasting

THANK YOU!

Ahmad Bukhari – IEP

QuickU (Mock :p Company)

THANK YOU!

Colab Notebook:

LINK