Production and Freight Analysis Using Power BI for Dana Spicer

Minor Project End Sem Review (Team No: I6)

Industry name: DANA ANAND

Team Members

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Outline of presentation

- Project Overview
- Market Survey
- Objectives
- Dataset Details
- System Design
- Results
- Testimonial

Project Overview

- **Domain**
  - Data Analytics
- **Problem Statement**
  - To create a business dashboard using Power BI for visualization of the Production and Freight data generated by the company for 24 hours monitoring.This prototype created is automized and plays an important role in smart manufacturing pipeline.
- **Problem Definition**
  - To provide the visual representation of key metrics to make on the go decisions.
  - To provide the model to predict and benchmark supply chain cost.
- **Applications**
  - To visualize the efficiency in the hierarchical manner so that the management can take necessary actions.
  - To visualize the production loss and reason for the loss in the hierarchical manner which will aid floor managers to make proactive decisions .
  - A tool to predict the cost based on the factors such as distance,toll fee,petrol charge,load of the vehicle etc.

Market Survey

- Power BI is a very strong data visualization tool. Different tools like tableau, QlikView, SAP Analytics Cloud, Amazon QuickSight perform similar functionalities to that of the Power BI.
- Compared with these tools, the main advantage of Power BI is thatof expense. All the tools mentioned above have higher expenses thus slowing the reach to Return on Investment(ROI).
- For small businesses, Power BI is the optimal tool because of the lower expense. The cost can be a major hurdle for most small businesses who want to digitalize to make the work more efficient but they are not affected much by it. Because it is a want and not a need, the cost they are likely to pay must be lower, and as Power BI is less expensive it is preferred.

Objectives

- **Production and Loss Analysis.**
  We aim to analyse the efficiency i.e Operation Equipment Efficiency(OEE) for the production of Plants and Value Stream for planned work and actual work done,and visualize the loss occurred per day, per week, per month and year with reason.
- **Freight Prediction.**
  We aim to predict the transportation cost using Machine learning model from one location to another based on the factors such as distance, vehicle capacity, terrain, fuel cost. The same to be visualized in dashboard.
- **Freight Analysis.**
  We aim to generate virtualization based on freight data produced by the company. This data needs to filtered out based on factors such as customer,location.

Dataset Details

- **Dataset Features**:
  - Data set for this application is provided by the company Dana Spicer.
  - Data is in form of xlsx.
  - Data set consists of production data of three months (March, April,May) and Freight data.
- **Dataset analysis** :
  - Production Data: The file consists of details of planned and actual production of the parts of vehicles. The consists loss details that includes time lost in minutes in each VSM for particular department and reason behind the loss.
  - Freight data: This file consists of detailed list of transportation cost which includes factors such as source, destination, vehicle capacity etc.

Day	Type	Part number	Trim	VSM	QTY	Eq Qty Factor	Eq Qty
3	Plan	10064896	10064896	CF DTA	304	3.0	912
3	Plan	5015802-B	5015802-B	SY 50 TON	630	0.7	450
3	Plan	5013734-2-B	5013734-2-B	SY 50 TON	630	0.7	450
3	Plan	2-3-12291	2-3-12291	B&G JJ 36	315	1.4	450
3	Plan	5015802-A	5015802-A	B&G JJ 36	315	1.4	450
3	Plan	Insku-100258-AA	Insku-100258-AA	B&G JJ 66	315	1.4	450
3	Plan	5013734-1-AA	5013734-1-AA	B&G JJ 66	315	1.4	450
3	Plan	6-3-2651X	6-3-2651X	1710 SY	255	3.5	900
3	Plan	26874538000000311	26874538000000311	1710 SY	225	4.0	900
3	Plan	10008233	10008233	Mazak-SY	750	1.2	900
3	Plan	10001198	10001198	Maruthi SY	450	1.0	450
3	Plan	100-5-16-M	100-5-16-M	Micromatic UJ	996	1.3	1245
3	Plan	3052B14771	3052B14771	GCL 140	1556	0.8	1245
3	Plan	55-5-46	55-5-46	Cincinati 1	975	0.9	900
3	Plan	55-5-38X	55-5-38X	Cincinati 1	373	0.9	344
3	Plan	10002816	10002816	Cincinati 2	1125	0.8	900
3	Plan	5012222-A	5012222-A	Cincinati 2	431	0.8	345
3	Plan	70-5-46-B	70-5-46-B	Bocca-1	1419	0.8	1135
3	Plan	2687456000000	2687456000000	Bocca-2	735	1.2	900
3	Plan	2687456000160	2687456000160	Bocca-2	147	1.2	180
3	Plan	3052B15761-S	3052B15761-S	SMT Grinding	995	0.8	796
3	Plan	5-462X	5-462X	KIT-1	281	1.2	337
3	Plan	6.5-6-208x-A	6.5-6-208x-A	KIT-1	300	1.2	360
3	Plan	3052B14771-G	3052B14771-G	GDS-1	1485	0.3	495
3	Plan	55-5-46-G	55-5-46-G	GDS-1	1330	0.5	665
3	Plan	55-5-38X-G2	55-5-38X-G2	GDS-2	2050	0.5	1025

DEPT wise day % | Old Daily Meeting | Mar-20 Daily MTD Plan VS Actual | Loading min | New Daily meeting | Daily Board | Productio

Figure:1.Production Data Sample

1			Minutes =	210944		
2		Date	VSM	Min	Losses	Reason
3	3CF DTANL-8-Planned Shutdown	3	CF DTA	0.1	NL-8-Planned Shutdown	No loss
4	3SY 50 TONNL-8-Planned Shutdown	3	SY 50 TON	0.1	NL-8-Planned Shutdown	No loss
5	3B&G JJ 36NL-8-Planned Shutdown	3	B&G JJ 36	0.1	NL-8-Planned Shutdown	No loss
6	3B&G JJ 66NL-8-Planned Shutdown	3	B&G JJ 66	0.1	NL-8-Planned Shutdown	No loss
7	31710 SYNL-8-Planned Shutdown	3	1710 SY	0.1	NL-8-Planned Shutdown	No loss
8	3Mazak-SYNL-8-Planned Shutdown	3	Mazak-SY	0.1	NL-8-Planned Shutdown	No loss
9	3Maruthi SYNL-8-Planned Shutdown	3	Maruthi SY	0.1	NL-8-Planned Shutdown	No loss
10	3Micromatic UJNL-8-Planned Shutdown	3	Micromatic UJ	50	NL-8-Planned Shutdown	Taper adjustment
11	3GCL 140NL-8-Planned Shutdown	3	GCL 140	0.1	NL-8-Planned Shutdown	No loss
12	3Cincinati 1NL-8-Planned Shutdown	3	Cincinati 1	0.1	NL-8-Planned Shutdown	No loss
13	3Cincinati 2NL-8-Planned Shutdown	3	Cincinati 2	40	NL-8-Planned Shutdown	G.W dressing
14	3Bocca-1NL-8-Planned Shutdown	3	Bocca-1	15	NL-8-Planned Shutdown	Taper adjustment
15	3Bocca-2NL-8-Planned Shutdown	3	Bocca-2	135	NL-8-Planned Shutdown	Taper adjustment -50' R.W dressing -40' GDS m/c grinding wheel dressing -45'
16	3SMT GrindingNL-8-Planned Shutdown	3	SMT Grinding	0.1	NL-8-Planned Shutdown	No loss
17	3AlexNL-8-Planned Shutdown	3	Alex	0.1	NL-8-Planned Shutdown	No loss
18	3KIT-1NL-8-Planned Shutdown	3	KIT-1	0.1	NL-8-Planned Shutdown	No loss
19	3KITNL-8-Planned Shutdown	3	KIT	0.1	NL-8-Planned Shutdown	No loss
20	3SPL-36 BC Assmbl.NL-8-Planned Shutdown	3	SPL-36 BC Assmbl.	0.1	NL-8-Planned Shutdown	No loss
21	3GDS-1NL-8-Planned Shutdown	3	GDS-1	0.1	NL-8-Planned Shutdown	No loss
22	3GDS-2NL-8-Planned Shutdown	3	GDS-2	40	NL-8-Planned Shutdown	G.W dressing
23	3Boring SPMNL-8-Planned Shutdown	3	Boring SPM	0.1	NL-8-Planned Shutdown	No loss
24	3B&G JJ 62NL-8-Planned Shutdown	3	B&G JJ 62	0.1	NL-8-Planned Shutdown	No loss
25	3B&G JJ 105NL-8-Planned Shutdown	3	B&G JJ 105	0.1	NL-8-Planned Shutdown	No loss
26	3B&G JJ 73NL-8-Planned Shutdown	3	B&G JJ 73	0.1	NL-8-Planned Shutdown	No loss
27	3J&J 63NL-8-Planned Shutdown	3	J&J 63	0.1	NL-8-Planned Shutdown	No loss
28	3HPSNL-8-Planned Shutdown	3	HPS	0.1	NL-8-Planned Shutdown	No loss
29	3Staddel-3NL-8-Planned Shutdown	3	Staddel-3	0.1	NL-8-Planned Shutdown	No loss
30	3PNR B&GNL-8-Planned Shutdown	3	PNR B&G	0.1	NL-8-Planned Shutdown	No loss
31	3Staddel-1NL-8-Planned Shutdown	3	Staddel-1	0.1	NL-8-Planned Shutdown	No loss
32	3EFD-1NL-8-Planned Shutdown	3	EFD-1	270	NL-8-Planned Shutdown	Machine shifting
33	3EFD-2NL-8-Planned Shutdown	3	EFD-2	0.1	NL-8-Planned Shutdown	No loss
34	3EFD-3NL-8-Planned Shutdown	3	EFD-3	0.1	NL-8-Planned Shutdown	No loss
35	3SY 50 TONNL-1-No Material	3	SY 50 TON	540	NL-1-No Material	No load
36	3SY 50 TONNL-3-Tooling Breakdown	3	SY 50 TON	180	NL-3-Tooling Breakdown	Broach getting struck
37	3B&G JJ 36NL-6-Setup Loss	3	B&G JJ 36	100	NL-6-Setup Loss	Setup changed

... Loading min. | New Daily meeting | Daily Board | Production | Summary | Loss Details | Loss dept cost | VSM, CT

Figure:2.Frieght Data Sample

	R	S	T	U	V	W	X	Y	Z	AA	AB
1	Created on	Created by	Customer	Customer Name	Vendor	Name	Year	Internal Excise Document No.	Excise Document Number	No. of Packages	Veh Registration No.
2	14-06-2021	C05SHIVANAND	0000400538	Employee Spicer India Pvt Ltd-Jodal			2021	0	9210501453	0	BYHAND
3	02-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA19B9363
4	03-05-2021	C05GSAVANT			0000100681	Pavan Industries	0	0		0	KA25A0897
5	03-05-2021	C05SHIVANAND			0000201382	Oerlikon Balzers Coating India Ltd	0	0		0	BYHAND
6	03-05-2021	C05SHIVANAND			0000201382	Oerlikon Balzers Coating India Ltd	0	0		0	BYHAND
7	03-05-2021	C05SHIVANAND			0000201382	Oerlikon Balzers Coating India Ltd	0	0		0	BYHAND
8	03-05-2021	C05SHIVANAND			0000201382	Oerlikon Balzers Coating India Ltd	0	0		0	BYHAND
9	03-05-2021	C05SHIVANAND			0000803420	Deepnanda Technologies Pvt. Ltd	0	0		0	KA25C9510
10	02-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA27A3572
11	02-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA25C8953
12	03-05-2021	C05SHIVANAND			0000803420	Deepnanda Technologies Pvt. Ltd	0	0		0	KA25C9510
13	03-05-2021	C05SHIVANAND			0000803420	Deepnanda Technologies Pvt. Ltd	0	0		0	KA25C9510
14	03-05-2021	C05SHIVANAND			0000803420	Deepnanda Technologies Pvt. Ltd	0	0		0	KA25C9510
15	03-05-2021	C05SHIVANAND			0000803420	Deepnanda Technologies Pvt. Ltd	0	0		0	KA25C9510
16	03-05-2021	C05GSAVANT			0000100681	Pavan Industries	0	0		0	KA25A0897
17	02-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA25B6980
18	03-05-2021	C05GSAVANT			0000100171	Shivprasad Industries	0	0		0	KA432189
19	04-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA432189
20	03-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA268917
21	03-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA268917
22	03-05-2021	C05SHIVANAND			0000100760	VIJAYALAXMI GEARS	0	0		0	KA227380
23	03-05-2021	C05SHIVANAND			0000100143	Genau Extrusions Ltd.	0	0		0	KA246401
24	03-05-2021	C05SHIVANAND			0000100143	Genau Extrusions Ltd.	0	0		0	KA246401
25	03-05-2021	C05SHIVANAND			0000100143	Genau Extrusions Ltd.	0	0		0	KA246401
26	03-05-2021	C05SHIVANAND			0000100143	Genau Extrusions Ltd.	0	0		0	KA246401
27	03-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA376868
28	04-05-2021	C05SHIVANAND			0000900004	Bhosale Tempo Service	0	0		0	KA25D0335
29	04-05-2021	C05GSAVANT			0000100681	Pavan Industries	0	0		0	KA25A0897
30	04-05-2021	C05SHIVANAND			0000201199	OMKAR PRESS TOOLS	0	0		0	KA25AA5805

Figure:3.Frieght Data

	A	B	C	D
1	Date	LR No	Vehicle No	Cost
2	01-05-2021	3241	KA17B1712	22277
3	02-May	3233	KA415703	22177
4	03-May	3466	KA25B4195	22177
5	16-May	3245	KA25B4195	22277
6	26-05-2021	3459	KA482798	22277
7	21-05-2021	3250	KA245751	22277
8	05-06-2021	3470	KA245751	23021
9	26-05-2021	3460	KA01D8241	16731
10	04-06-2021	3468	KA432189	16731
11	09-06-2021	3479	KA25D1769	18819
12	13-05-2021	3237	KA25D1769	13404
13	13-05-2021	3239	KA25B7137	13404
14	20-05-2021	3246	KA268917	13404
15	20-05-2021	3247	KA246401	13404
16	02-04-2021	3248	KA376868	13404
17	21-05-2021	3249	KA432189	13404
18	24-05-2021	3451	KA25D0335	13404
19	24-05-2021	3452	KA25A5175	13404
20	27-05-2021	3464	KA22A9132	13404
21	06-06-2021	3472	KA25D0335	13404
22	06-06-2021	3473	KA22A5175	13404
23	08-06-2021	3476	KA28A5897	13404
24	08-06-2021	3480	KA25B4195	14204
25	08-04-2021	3104	KA25MB4713	10200
26	08-06-2021	3478	KA25B9903	13404
27	27-05-2021	3462	KA25B9903	13404
28	06-06-2021	3474	KA01D8241	13404
29	17-04-2021	3128	KA28aA5897	13404

Sheet2 | Verification | Agreement | Sheet1 | Sheet6

Figure: 4.Frieght Data

System Design

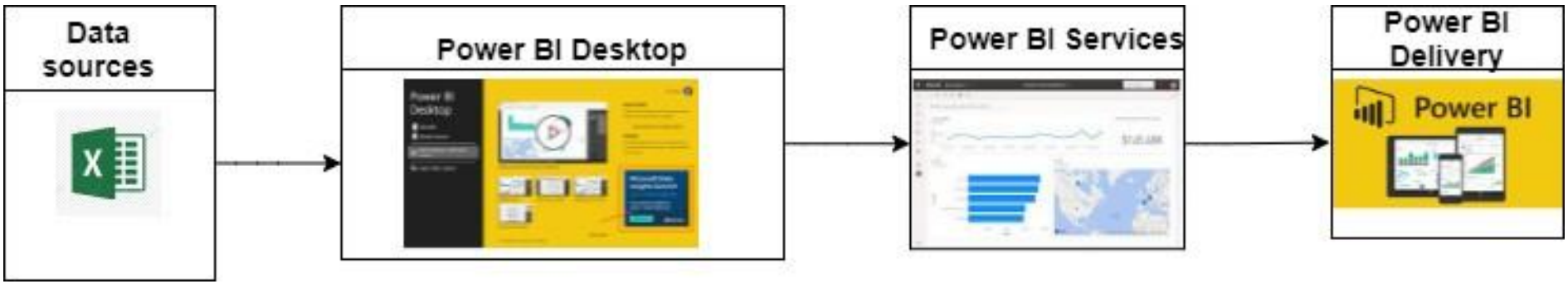

Figure:5.Architectural Design

Data Pre-processing

- **Requirement-1 and 3**:
  - Removing errors and null records.
  - Updating data with relevant data types.
  - Attribute reconstruction.
  - Removing the irrelevant data, which are not required for visualization.
- **Requirement-2** :
  - Data obtained from the company was untidy and contained many unwanted features, so removed them before using the data for freight analysis.
  - Null values were tackled using mean method.
  - Detected outliers using a boxplot and remove them.

Detail Design

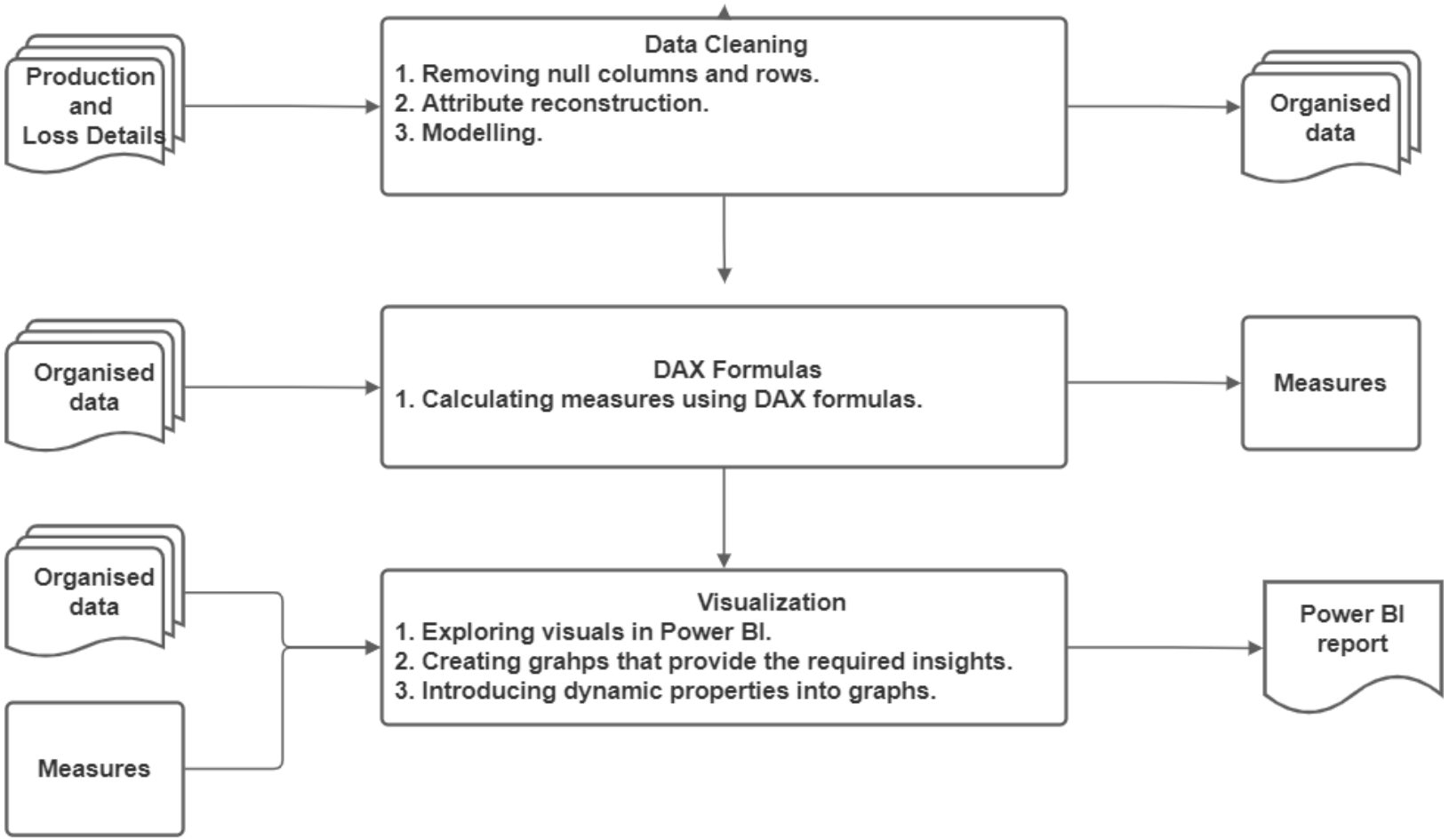

Figure:6.Detail Design for Product Analysis

Detail Design

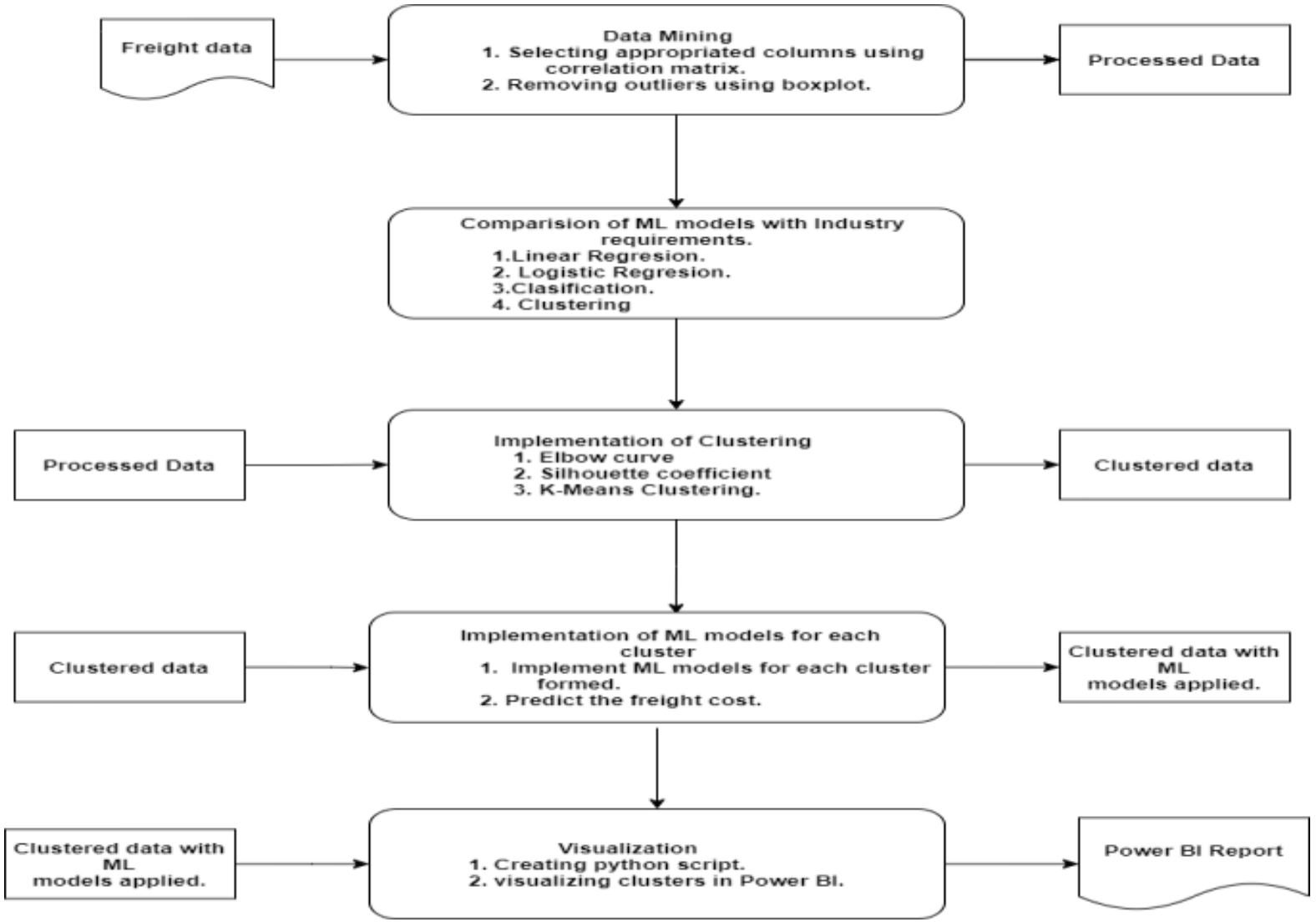

Figure:7.Detail Design for Freight Prediction

Detail Design

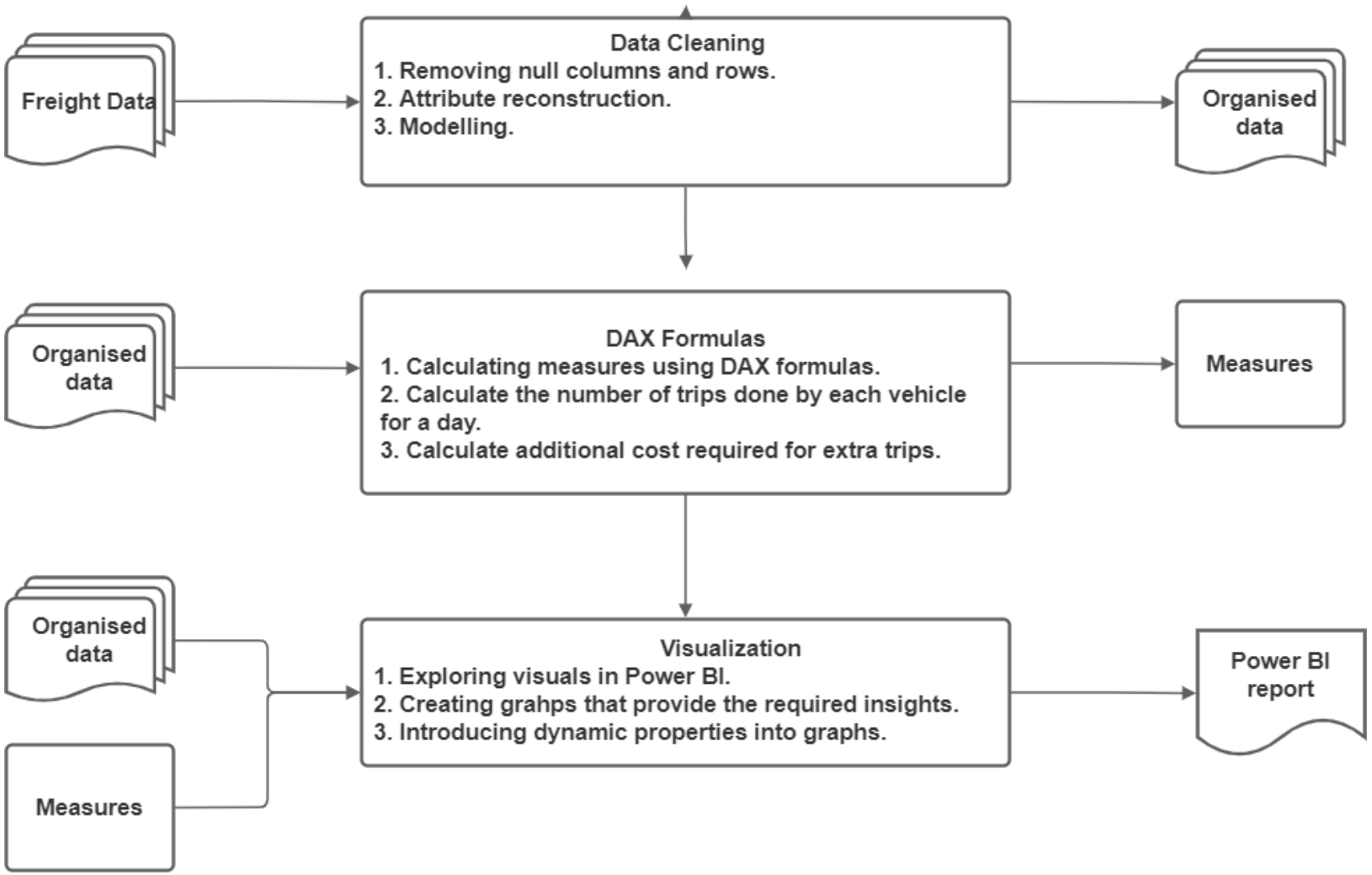

Figure:8.Detail Design for Freight Analysis

Results

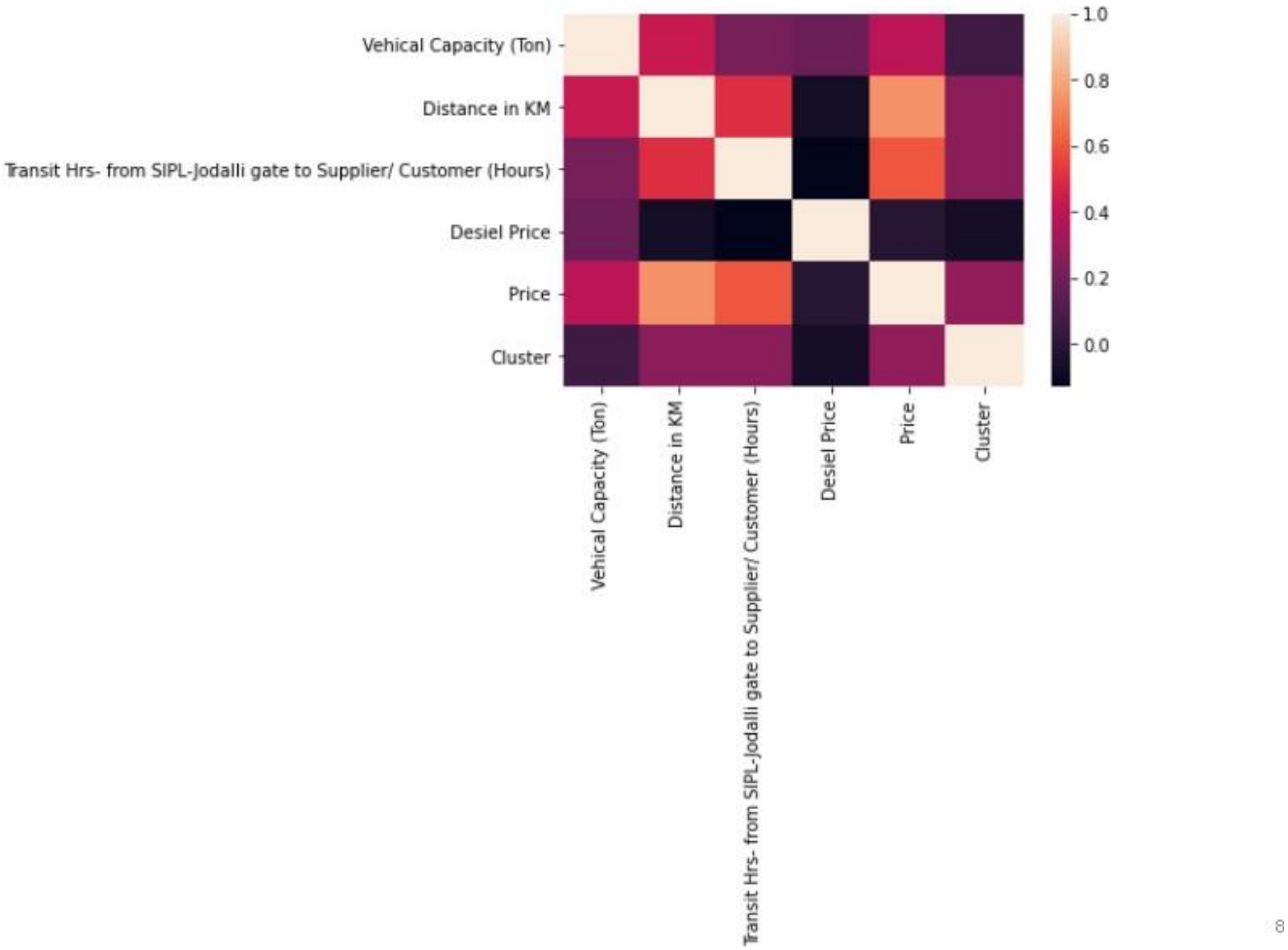

Figure:9.Heat Map

Results

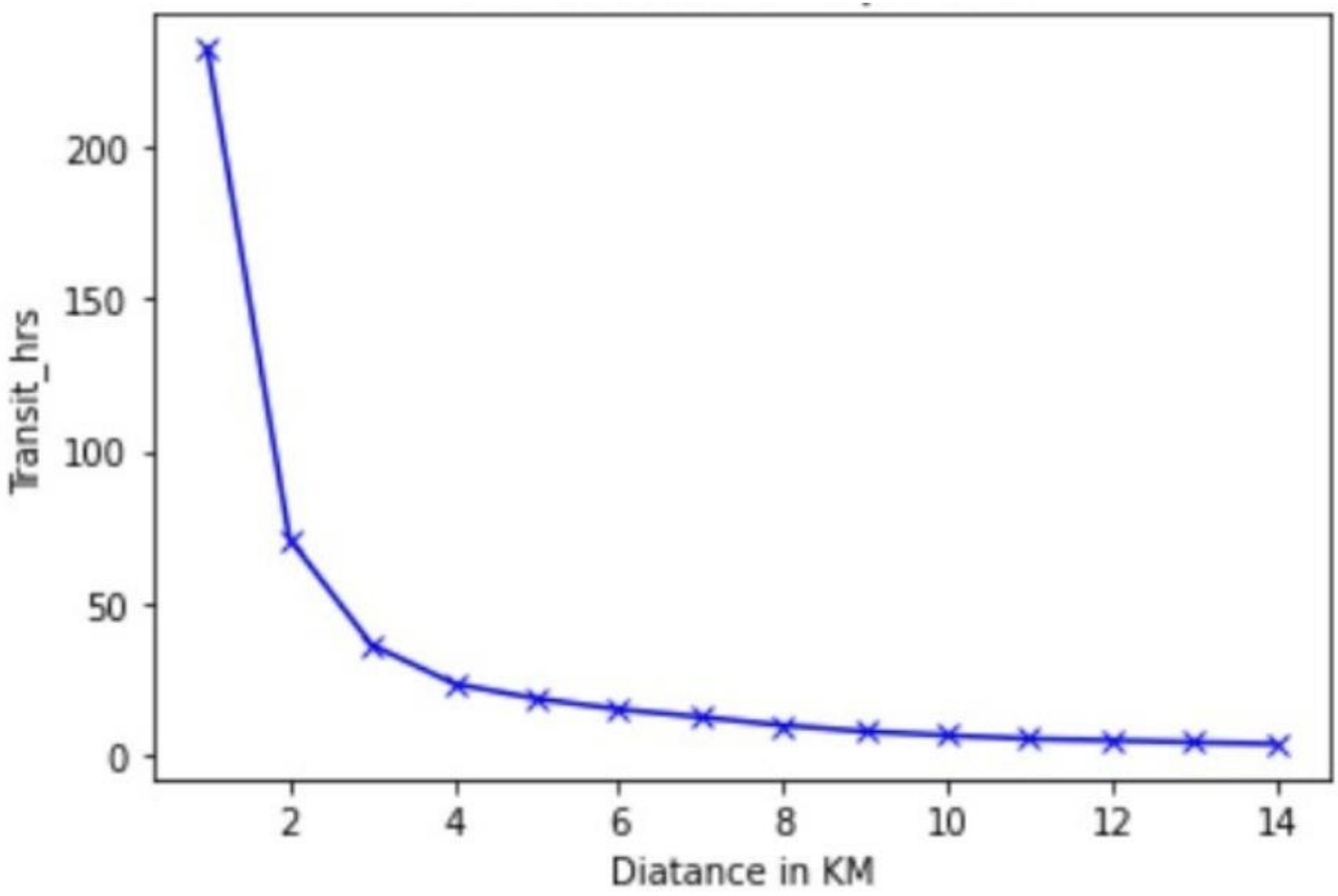

Figure:10.Elbow Curve

Results

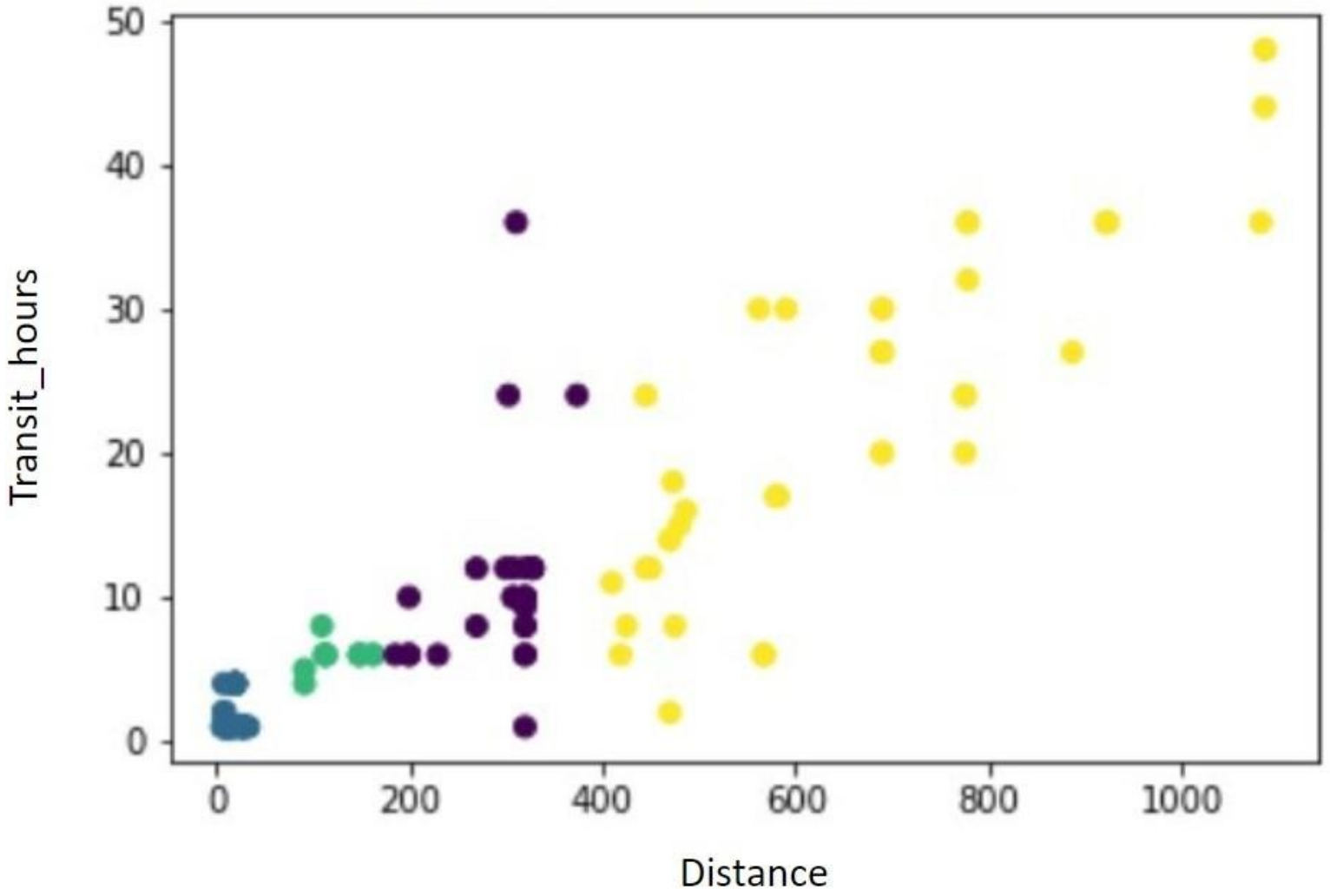

Figure:11.Clusters

Testimonial

Thanks Team for sharing the Production & Freight Dashboard in Power BI!

Appreciate your efforts in learning a tool in quick time and executing what I had in mind at the start of the objective.

The logics were complex and you had a lot of data from different sources to handle. The in-depth understanding of the purpose of the dashboard and the data has enabled you guys to quickly grasp what I was thinking and execute the same.

Handling of large amount of data from different sources is the skill which is a lot in demand and I hope this project fairly introduced you to what the industry expe from an IT person.

I am very happy with the way the dashboard has come out for the Production & Freight.

I will be sharing the Dashboard with the actual users and will share their feedback in a week's time.

P.S – Thanks to Amulya for co-ordinating with you on the Freight Dashboard.

Regards

Barath Murali
Finance Controller
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Survey no :- 25/26 A, Jodalli,
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Figure:12.Testimonial

References

- Minewiskan. ”DAX Function Reference - DAX.” DAX — Microsoft Docs. Accessed April 27, 2021. https://docs.microsoft.com/en-us/dax/dax-function-reference.
- Microsoft Power BI.” Wikipedia. March 29, 2021. Accessed April 27, 2021. https://en.wikipedia.org/wiki/MicrosoftPowerBI.
- Scardina, Jesse, and Lauren Horwitz. ”What Is Microsoft Power BI? - Definition from WhatIs.com.” SearchContentManagement. December 03, 2018. Accessed April 27, 2021. https://searchcontentmanagement.techtarget.com/definition/Microsoft-Power-BI
- Otarb. ”Create Power BI Visuals Using Python in Power BI Desktop - Power BI.” Create Power BI Visuals Using Python in Power BI Desktop - Power BI — Microsoft Docs. Accessed April 27, 2021. https://docs.microsoft.com/en-us/power- bi/connect-data/desktop-python-visuals: :text=Select the Python visual icon,appears on the report canvas.

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Thank You