**Final report**

1. Executive Summary:

- Briefly summarize the project's goals, key findings, and recommendations.

After seeing the data for this challenge I was pretty sure that it would no smooth ride at the analytical side. What’s worse is I started late on the challenge thinking it would be an easy one that turned out to be very difficult at least for me.

- Highlight the most important insights for stakeholders who may not read the entire report.

For this project, two metrics are taken as the key focus. The metrics mainly considered are the (total number of defects and the total downtime) in operation that the defects have caused.

The key objectives are to understand the best and worst suppliers with respect to quality, the business effects, and how well we are handling the defects obtained. The objectives here determined the Business Questions to be answered.

The (total number of defects) obtained do not automatically translate to downtime experienced. The key is to know where downtime is experienced (plant and supplier), and direct the focus on it.

2. Introduction

- Provide background information on the project, including its purpose and objectives.

You are working with a manufacturer who receive and order a number of raw materials which are then used in production or for general maintenance.

Currently there is no procurement system in place and no way for the companies to validate which suppliers are providing us with quality goods and which are not.

There is also no consistency between different plants and the vendors we are purchasing from.

The operation management team have identified the need to centralize and understand supplier quality as a priority.

There has been a major effort in recent weeks to consolidate the data.

The team have now managed to gather data from across the plants with information around the material, defect and vendor.

They have also managed to get the number of defected materials and also provided a value for the minutes of downtime caused by the defected material.

The management team are now looking for some help to visualize and extrapolate the findings from this data.

- Define the problem or question you are trying to answer.

Some key questions the business want answering are;

1) Which vendors/plants are causing the greatest defect quantity?

2) Which vendors/plants are causing the greatest downtime?

3) Is there a particular combination of material and vendor that perform poorly?

4) Is there a particular combination of Vendor and plant that performs poorly?

5) How does the same vendor and material perform across different plants?

6) Who are our best suppliers with respect to quality?

7) Who are our most favourable suppliers (business effect)?

8) Who are our worst suppliers with respect to quality?

9) Who are our least favourable suppliers?

10) How much effect do our worst suppliers have on our business?

11) What is our worst managed material type? Any reason?

12) How well are we managing the defects experienced in comparison?

The business are hoping that you can help answer these questions and maybe even provide some insights that they may have overlooked.

- Outline the data sources and methods used for analysis.

Story behind the Report

At first I thought that presenting the (defects quantity) would be useless as there was no comparative data to analyze with but later realized that there might be some correlation between Downtime & Defects and I was right. It is not necessary that the defective material will cause downtime as with some tweaks while running the material can avoid the downtimes. There were some instances where the number of defects were lower but downtimes were higher and vice versa.

Second part was to choose what slicer to show on the report and what to hide in the navigation panel. The main slicer I found was the (Defect Types) that showed whether the defective material caused delay in production denoted by Impact or caused total shutdown of a particular production as the material was not suitable for use denoted by Rejected or the defective material had No Impact at all. However, the question I had was if the defective material had No Impact at all. However, the question I had was if the defective material had no impact then why the company had the downtimes? So I assumed that the Downtime was caused by reasons other than the defective materials i.e. maybe problem in a machine, power flickers, shortage of staff during vacation seasons or delay in getting the material. This was the Main Point of the analysis that will be shown in the Vendors section and in Downtime Impact analysis.

3. Data Exploration

- Describe the data sources and their characteristics (e.g., size, format, quality).

Following the aims of this project, a methodology involving metrics extraction, data modelling, and reporting through reporting was adopted. The tools then utilized were Microsoft Excel, Microsoft Power Pivot and Tableau

The data was initially uploaded into Power Pivot through Microsoft Excel to a data model to ensure the integrity of the data, and handle complexities that may arise from the data scaling as more transactions are made.

I created 4 other sheets on this data set which is:

1- Total defect report by defect type & plant

2- Total defect Qty by defect type & material type

3- Total downtime min by material type

4- Total downtime min by plant

With the data uploaded to tableau and start to make the visualization analysis, a few simple metrics were extracted from the dataset to aid in development of the needed reports and insights.

The first metric to be evaluated was to obtain the (total number of defects) that have been faced as a measure.

This metric serves as a base for analysis involving the number of defects faced. We will see more about this in coming commands. The calculation fields command used to obtain this is:

Total defect= COUNT([Defect])

Total plant = COUNT([plant])

Total Vendors = COUNT([vendor])

Down time ratio = DIV([Total Defect Qty], [Total Downtime Minutes]) \* 100

Total defect qty max = INT(MAX([Defect Qty]))

Case.measure QoQ / YoY = (ZN(SUM([c. measure para])) - LOOKUP(ZN(SUM([c. measure para])), -1)) / ABS(LOOKUP(ZN(SUM([c. measure para])), -1))

Month –Year = DATETRUNC('month',[Date])

- Summarize the data through descriptive statistics and visualizations (e.g., histograms, box plots, correlation matrices).

Done at tableau

- Identify any data cleaning or preprocessing steps taken.

Example

1) At plant sheet:

State(abbv) = TRIM(SPLIT([Plant], ",", 2))

City = TRIM(SPLIT( [Plant], ",",1))

2) Add (Date) sheet with using power pivot

3) amend data type at every she

4. Data Analysis

- Present the key findings and results, supported by visualizations and statistical evidence.

My analysis was focused at the questions posed in the Problem Brief and I looked at the following aspects in the supply chain

‘Material Types’ and ‘Category’ leading to materials having most defected quantity.

‘Material-Vendor’ combination responsible for most defected quantity

‘Material-Vendor’ combination causing the most ‘Downtime Events’ at plants

How the same ‘Vendor-material’ combination performing across different plants and responsible for most defected quantity, although this gives little insight at pinpointing the actual reason for the defected quantity without the data on total material being supplied

The relationship of ‘Downtime Events’ with ‘Downtime duration’ at plants

Which ‘vendor-plant’ combination is producing the most defected materials and causing most downtime in number of days

Calculate an overall score for worst performing ‘Vendor-Plant’ combination and determine the overall ranking based on that score.

This was achieved by using measures and some ranking techniques to come up with the ‘overall score’ for the worst performing ‘vendor-plant’ combination for each year.

- Discuss any unexpected or interesting discoveries.

Added some parameters to make an advanced analysis

5. Insights and Recommendations

- Interpret the findings and draw meaningful conclusions.

- Provide actionable recommendations based on the insights.

- Address the original problem or question posed in the introduction.

Do more defects translate to more downtime?

As observed in the analysis, more defects do not necessarily translate to more downtime. It is however advisable to keep the number of defects at a low because there is no direct or indirect relationship established.

6. Limitations and Future Work

- Suggest potential areas for further exploration or improvements in future studies.

Limitations and Improvement Opportunities

Absence of the total orders or supplies data. This is needed to ensure that the performance analysis performed is mostly relative performance rather than an absolute performance analysis.

7. Conclusion

- Summarize the key findings and recommendations.

- Reiterate the importance of the project and its potential impact.

8. Dashboard interactivity:

- Your dashboard must support end user ability to change and interact with the provided charts and tables.

- Relying heavily on annotations and highlights.

- Colors scales must be chosen carefully.

Example Sections and Visualizations:

-Data Exploration: Histograms, scatter plots, correlation matrices, summary statistics

-Data Analysis: Define the needed measures and calculated columns to address high level analytics.

-Insights and Recommendations: Bar charts, pie charts, line charts, tables

Remember to tailor the report to your audience. Consider their level of technical expertise and the specific insights they need. Use clear and concise language, and support your findings with compelling visualizations.

Project Grading:

- 60% on Dashboard quality and compliance to the above mentioned conditions and terms.

- 40% on the final report.

Good Luck!