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Executive Summary

This report provides an analysis and evaluation of the current and prospective sales, profitability and financial state of Lupita's Cafe company. The relevant operational data has been provided for the years 2018 and 2019 and data for the year 2020 is generated using KNIME. Methods of analysis include trends, horizontal and vertical analysis as well as calculations of Key Performance Indicators such as Profit and Margin.

The tools used for the analysis are Google Colaboratory and Tableau. Google Colaboratory was used to conduct an initial exploratory analysis of the data and Tableau was used to deploy two dashboards: C-suite and Managerial Level. The C-suite Level dashboard provides a high-level perspective of the company's present and projected revenues. The Managerial Level dashboard gives a more in-depth look at the state of the business and the performance of each product. Tableau Online was used as a collaborative tool.

The analysis highlighted the weaknesses of the business and which areas can be improved to increase growth in the forthcoming years. The initial method of data collection made analysis difficult and insufficient but the Business Intelligence methods deployed in this report reveal troubling financial forecasts, trends and solutions.

KNIME Workflow

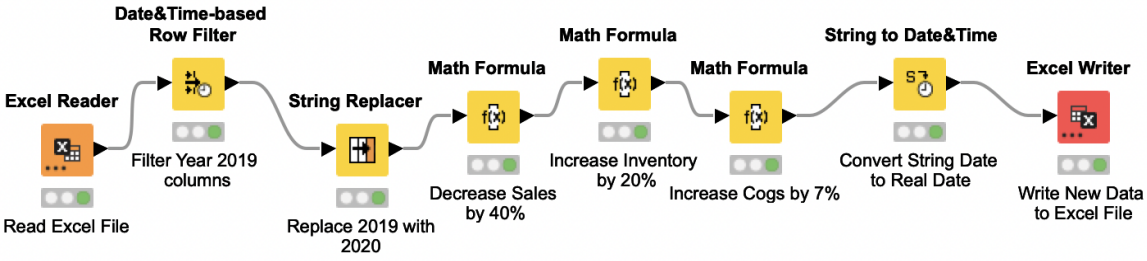

Figure 1: Variable Non-Null Count and Data Types

The first step to creating the dummy data, is to read the excel file containing the records of 2018 and 2019 using the Excel Reader node. The columns that concern 2019 are then filtered out with the Date&Time-based Row Filter. Using the String Replacer, we replaced all “2019” occurrences with 2020. We proceed by using three Mathematical Formula nodes to perform the following calculations:

1. Decrease Sales by 40%: $Sales$ - $Sales$ * 40/100

According to the British Coffee Association (2022), coffee shops had suffered a sales decline of 40% in 2020.

2. Increase Inventory by 20%: $Inventory$+$Inventory$*20/100

The start of 2020 was uneventful and supply chains were operating as normal. However, the first lockdown imposed to stop the spread of the Covid-19 pandemic saw restaurants and coffee chains alike close down and therefore all operations came to a halt which as a result meant that Lupita's Cafe inventory was not sold at the normal rates. This resulted in an increased inventory.

3. Increase COGs by 7%: $COGS$ + $COGS$*7/100

According to *S&P Global (2021), the cost of goods sold for 2020 saw a 5.95% increase.*

The final step of the KNIME workflow is to write the newly created data to an excel file using the Excel Writer node. The budget fields remained untouched as the pandemic was not anticipated and therefore the company's budget calculations were not affected.

Exploratory Data Analysis

The dataset now contains operational information from 2018 to 2020. It consists of 6372 records and 18 attributes. An initial exploratory analysis is conducted to explore the nature of the data using Python and Google Colaboratory. The excel file was read into a pandas dataframe and then using the info() function we get the non-null count and the data types of all the variables. All columns contain 6372 records and therefore no missing values.

```
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Date            6372 non-null   datetime64[ns]
 1   Country         6372 non-null   object
 2   State           6372 non-null   object
 3   Market Size     6372 non-null   object
 4   Product         6372 non-null   object
 5   City            6372 non-null   object
 6   Product Line    6372 non-null   object
 7   Product Type    6372 non-null   object
 8   Type            6372 non-null   object
 9   Budget COGS     6372 non-null   int64
 10  Budget Margin   6372 non-null   int64
 11  Budget Profit   6372 non-null   int64
 12  Budget Sales    6372 non-null   int64
 13  COGS            6372 non-null   float64
 14  Inventory       6372 non-null   int64
 15  Marketing       6372 non-null   int64
 16  Sales           6372 non-null   float64
 17  Total Expenses  6372 non-null   int64
```

Figure 2: Variable Non-Null Count and Data Types

We then investigate the unique values of the categorical variables.

```
[20] df_cat= df.select_dtypes(exclude=['float','int64', 'datetime64']) # include only object type variables
     for col in df_cat.columns:
         print(df_cat[col].unique()) # to print unique values

     ['United Kingdom']
     ['England' 'Scotland' 'Wales']
     ['Small Market' 'Major Market']
     ['Decaf Irish Cream' 'Decaf Espresso' 'Caffe Latte' 'Chamomile' 'Lemon'
      'Caffe Mocha' 'Colombian' 'Regular Espresso' 'Darjeeling' 'Green Tea'
      'Earl Grey' 'Amaretto' 'Mint']
     ['Basingstoke' 'Bristol' 'Dundee' 'Leeds' 'Barry' 'Aberdeen' 'Cumbernauld'
      'London' 'Rhondda' 'Swansea' 'Birmingham' 'Glasgow' 'Briton Ferry'
      'Clydach' 'Liverpool' 'Manchester' 'Cardiff' 'Edinburgh' 'Reading' 'Bath']
     ['Beans' 'Leaves']
     ['Coffee' 'Espresso' 'Herbal Tea' 'Tea']
     ['Decaf' 'Regular']
```

Figure 3: Attribute Unique Values

We now have a clear image of the locations and products, product types and product lines of the cafe. Next, we check the distributions of the numerical variables. This could also be implemented in Tableau, but using python we can easily plot all the histograms at once.

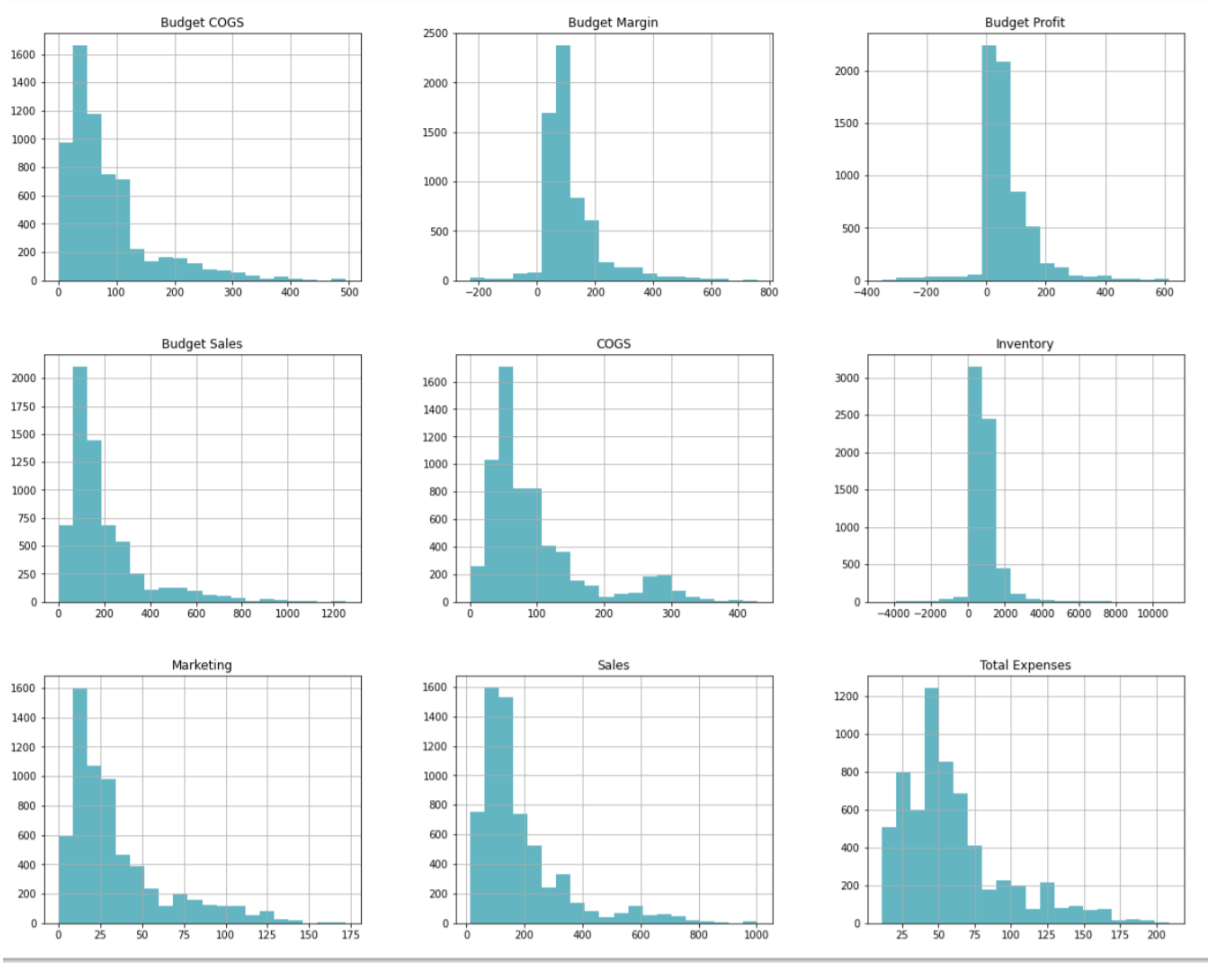

Figure 4: Numerical Variable Distributions

It is clear in Figure 4 that most of the distributions are positively skewed.

Calculated Fields for the Key Performance Indicators (KPIs)

To further aid our analysis, we created calculated fields for three Key Performance Indicators:

- Margin = Sales – COGS

- Profits = Sales – COGS – Total Expenses
- KPI Sales:
  if SUM([Sales]) >= SUM([Budget Sales]) then "Sales Goal Met"
  ELSE "Sales Goal Not Met"
  END

Dashboard Analysis

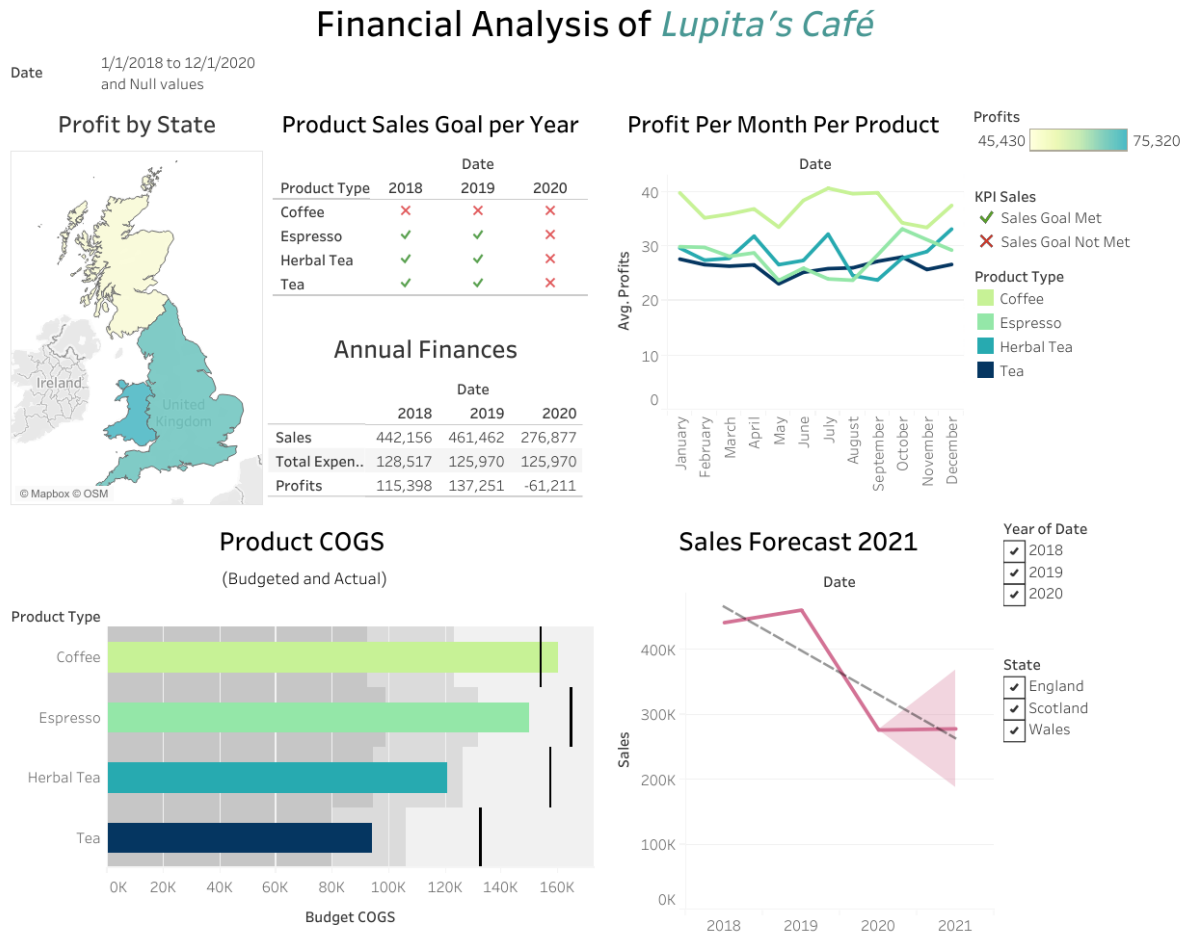

Figure 5.1: C Level Dashboard

C Level:

This dashboard was designed with the needs of C-suite members in mind. It represents a story with a problem that helps the reader come to conclusions about the strategic changes the business requires to observe growth in the future.

Analysis of the Problems:

After creating multiple charts with different elements and measure values with the dummy data, a number of issues were spotted, the most important one; the budget profits

were not being met for coffee and for the year 2020. Therefore, this became the objective of the C Level dashboard.

As it can be observed from the dashboard, a symbol map named “Profit by State” shows the regions the business operates in and the profits. Although Scotland seems pale in comparison to England and Wales, it would be incorrect to assume that this is exclusively where the problem lies. The following charts, “Profit Per Month Per Product” and “Products COGs”, help complete the picture.

Taking all the information from the charts into consideration, we can conclude that the business is facing the possibility of financial hardships in the near future because COGS(Costs of Goods Sold) are far too high compared to Budget COGS which throws the whole business model off balance.

In addition, coffee does not perform as well as expected at any point in time even though it records the highest profits in the “Profit Per Month Per Product” chart. This is a result of the goals for coffee being potentially unrealistically high whilst the goals for espresso, herbal tea and tea are set low enough to be reached in the pre-pandemic era.

In the aforementioned chart, many seasonal trends are showcased which the company should investigate in detail, as coffee is performing as expected according to the holiday seasons but espresso, herbal tea and tea are not and instead seem to show minimal consistency. This is by all means bizarre. BI solutions could help uncover the mysterious roots of this trend.

The last observation made by studying the charts is that the “Annual Finances” chart reveals to us that 2020 is in red as the year ended in a loss equivalent to almost half the average profit of 2018 and 2019. It should be noted that an assumption was made that sales decreased by 40% in 2020 due to the impact of the lockdowns and restrictions but nonetheless, COGS have been more costly than expected from the beginning.

Solutions:

The main issue that needs to be addressed is the actual COGS exceeding budget COGS by a margin that is detrimental to the goals of the business. Assuming that this is appropriately and efficiently dealt with and COGS reach budget COGS, Lupita’s Cafe can hopefully get back on its feet after the losses recorded in 2020.

It would also be wise of the company to investigate why espresso, herbal tea and tea are selling at such an inconsistent and disappointing pace. All products should be promoted and pushed until they start performing as well as possible.

Details:

A colour theme can be observed in both dashboards as an assumption was made that this colour palette is associated with the brand’s marketing. Furthermore, the colour palette was selected as it has a combination of bright and dark colours as well as jewel tones, making it ideal for branding for every season of the year.

The chart named “Sales Forecast” is separated from the other charts with a magenta palette so as to draw the attention of the C Level members as it is the chart that depicts the most worrying information which is that the business will suffer substantially if the

company's strategy remains the same. This would not be observable with the current Excel files alone, filled with data that becomes pointless if it is not used to create a picture, further proving why the executives and stakeholders of Lupita's Cafe should implement BI solutions.

A reasoning was followed when designing the graphs and when selecting the graph types. It was of utmost priority for the charts to grasp the attention of the observer immediately and to be simplistic without too many numbers clouding the mind. Therefore, the dashboard begins with a symbol map to visualise the regions as much in the observer's eyes as their mind. The following two charts are text charts with one providing numbers that were deemed important for the C Level stakeholders to see and the other showing whether the goals were met or not in an even more simplistic, eye-grabbing way. The dashboard is completed with a line chart, a bullet chart and a final line chart in which the trend line was plotted to provide additional visual aid about what is happening.

Dashboard Features:

The dashboard has various filters including one in the format of a slider. The filters embedded allow the user to change the data visualisations depending on the year, date or state featured.

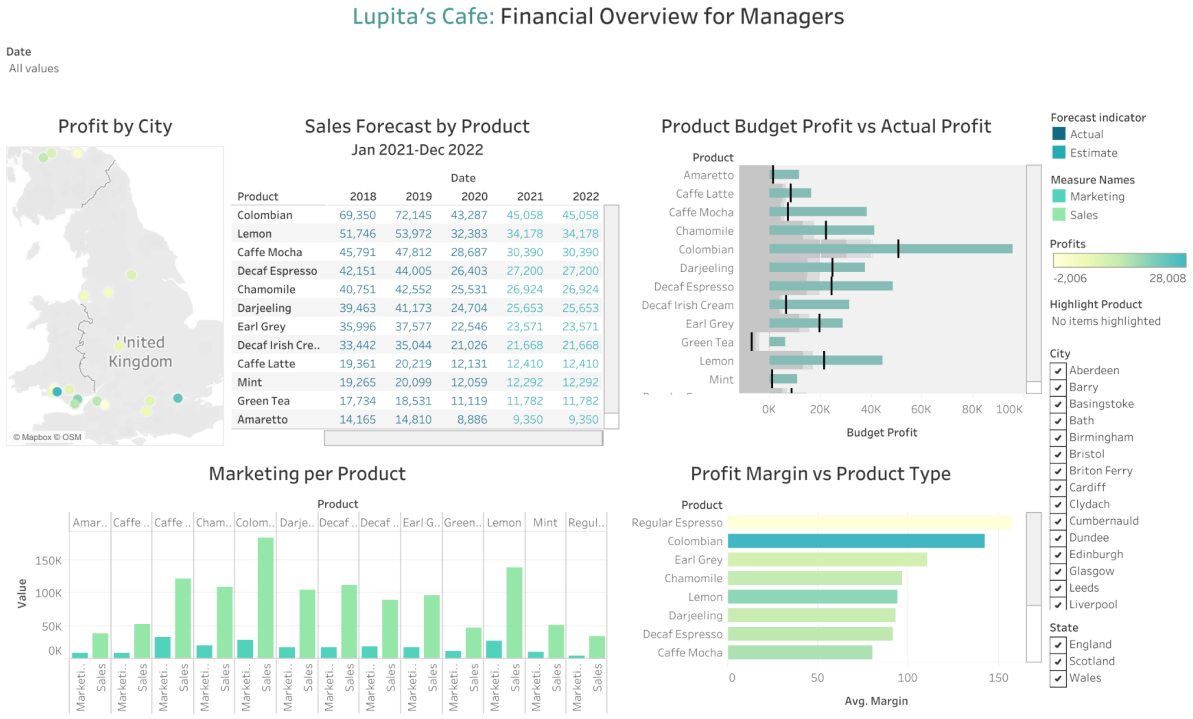

Figure 5.2: Managerial Dashboard

Managerial Level:

The design of this dashboard was based around the requirements of managers. It focuses heavily on products and their performance by city and paints the picture by numbers which is the opposite of what the C Level dashboard aims to do. Managers are able to make a difference in the business, Lupita's Cafe, by taking this product-based approach and

implementing any reasonable solutions to their stores, although supervisors and stakeholders in higher positions might need to approve certain changes.

Analysis of the Problems:

As managers are not responsible for high-level executive decisions, what concerns them the most is how well their store and the products are doing. With that in mind, this dashboard does not come with a storyline for the business' strategy but reveals significant information about the performance of cities and products.

First issue which can be observed is that green tea has been performing terribly as it has brought in the least amount of profit. This issue is visible in the first bar chart in the top right corner of the dashboard, where it should also be noted that the disappointing profit compared to the budget profit is depicted.

The following chart, named "Marketing per Product", demonstrates the sales of each product and how much marketing takes place. It is rather surprising that although the marketing of every product is beyond underwhelming next to the sales bar, sales are relatively high. However, sales may be high but for a number of reasons, including the unexpected high cost of COGS and as a result, the profit margin, Lupita's Cafe is not thriving from a financial perspective and ended 2020 in the red.

Lastly, a closer look to the last chart of the dashboard, named "Profit Margin vs Product Type", visually displays to managers that the most profitable product is the espresso.

Solutions:

Multiple solutions can be deployed by managers to address these issues found in the dashboard that takes all regions into consideration. Managers should additionally take the time to use the filters of the dashboard and analyse what positive or negative trends exist in their respective cities.

The green tea issue can be solved by marketing the product better and requesting less inventory.Furthermore, we can positively conclude from all the bar charts of the managerial dashboard that the gap between the actual profit and the budgeted profit must start closing and therefore, rigorous marketing of every product will help Lupita's Cafe move forward and survive the damage the pandemic has caused. The last important change managers can make is to promote espressos to customers more as espressos are the most profitable product offered on the menu. It should be noted that better marketing and promoting can be achieved through improved advertising, offers and other solutions derived from Business Intelligence.

Details:

As mentioned in the previous sub-chapter, the colour theme of the dashboard is related to what was assumed to be the colour theme of Lupita's Cafe branding.

The managerial dashboard has a similarity to the C Level dashboard in that they both begin with a symbol map, with the difference being that the managerial one is about profit per city, instead of state. This was done to allow managers of all cities to observe how well their city is doing and how well it is doing compared to other cities and regions.

The following chart is a text chart with a lot of data and details which shows past sales and forecasts. A text chart was chosen over a line chart for forecasts in this case as

managers should be able to see the predicted numbers and report back to supervisors about how well these goals are being met. The rest of the charts on the dashboard are bar charts, arguably the easiest graph type to understand without much thought, making these charts both number-oriented,simple and efficient.

Dashboard Features:

Numerous filters have been implemented in the chart as well as a highlight to assist managers in analysing a product as they can search it and watch it in highlighted form. Once again, a date filter in the slider format has been added and two filters for city and state have also been included.

Conclusion

In conclusion, Lupita's Cafe is no different to any other business as it can massively benefit from Business Intelligence methods for analysis and solutions. Data visualisation helps stakeholders at any level of a company's hierarchy better understand the data at hand and identify patterns from which strategic solutions can be derived. As humans can better understand trends and large data sets with visual aids, applying these BI methods in KNIME and Tableau provided us with the tools and charts to not only make relevant observations but to also decide what the business requires to get back on track.

Reflections

This project equipped us with skills we plan to use in our future jobs as well as our dissertations as we discovered the endless possibilities of Tableau which surprised us as much as they excited us and got to play around with KNIME again. As this was teamwork, we wanted to be able to work on the same workbook at the same time in Tableau and in order to achieve this, we used Tableau Online.

We believe that next time we are asked to create a business case, we will be ever more confident as the requirements of this report forced us to deeply understand why our choices with graphs and colours matter, although we took into heavy consideration what we would like to see on a dashboard; that would be equally eye-catching and informative. Even though we understand that Business Intelligence is far more complex than the snippet we got from this project, we are positive that the knowledge acquired will be very useful in the future.

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