Data Visualization Coursework Report

Module Code: CS3DV20
Assignment report Title: CS3DV20 Individual Coursework
Student Number: 26000944
Date (when the work completed): 16 - March - 2021
Actual hrs spent for the assignment: 30 hours
Assignment evaluation (3 key points):

- I enjoyed using a real-life case study and business solution to develop a piece of portfolio-worth work applicable for my future desired career.
- The coursework seemed to require more knowledge about financial aspect of business functioning that I found I knew as a computer science student. On the positive side, that helped to expanded on expanding the knowledge boundaries and business analyst qualification.
- I would have appreciated more guidance on how many dashboards would be a good guideline for overthinkers!

Problem Overview

Lupita's Cafe is a coffee chain that has been in the market for the last 10 years. During this time, they have been successfully using a transactional platform that allows them to record and store the operational information of each store.
Lupita's Cafe requires help with automation of data analytics. The management has been analysing this data in Microsoft Excel, but the process is time consuming and the level of analysis, hence making Excel visualisations hard to understand and the current decision-making process difficult and rigid. A senior user has suggested implementing a Business Intelligence (BI) solution.
The company objective is to know the benefits of adding a BI solution to their internal portfolio of IT solutions. A member of the board is sceptical about this proposal as he thinks that the Excel analysis is more than enough and there is no need for an external consultant to help them in the decision-making process.

Why Tableau (and not Excel)?

As the first step of analysis, it is important to understand the objectives and obstacles faced by the company. The aim of the visualisations is to produce an easy to track set of graphs combined for different organisation levels within the company. As explained later on in further details, the CEO is likely to be more interested in the profit and risk taking to maximise the profit in the future, whereas the manager will be addressed to look into each region's / store's performance.

As discussed in Problem Overview, Excel is useful as a start-off point for recording and understanding data, as well as performing basic data analysis and calculations with the limited data visualisation capabilities offered by Excel. The application would probably be enough if the cafe was an independent single location, however as the database increases with the expansion of the business, it does not quite fulfil the business needs of the business.

Tableau is a no-code solution for effective data visualisation for creating dashboards aimed at a specific audience with specific needs. Firstly, Tableau has ready to offer graphical solutions with the information provided and many manual processes that are being done in Excel are automated. Also, Tableau is cross-platform compatible, meaning the dashboard view, unlike Excel, will adjust for

any device of your choice and the dashboards can be previewed how they look on different devices. Additionally, Tableau is capable of both dynamic and static dashboards with the ability to drill down data for relevant observations. That is one of the numerous features that will make tracking performance with Tableau much more automated and easier for the business.

As the result of my prototype design solution, Lupita's Cafe will have a good understanding of the minimum capabilities Tableau and the team will be persuaded into exploring the solution further. To prove the relevance, I will be using the financial performance dataset provided for Lupita's Cafe to put together three basic visualisations that can later be expanded, depending on the company's preference.

KPIs (Key Performance Indicators)

KPIs is "a measurable value that demonstrates how effectively a company is achieving key business objectives". These are being set within a specified timeframe using indicators to show that business is performing up to set targets and expectations. This is done by frequent check-ups in forms of frequent meetings.

As we have the data set for 2018 and 2019, my assumption, that will be discovered more in the 'Assumptions' part of the report, is that the forecast and KPI are to be produced for 2020.

Some, but not limited, tactics to see the impact of certain actions could be:

- Experimental investment of a specific amount into a developed marketing strategy and tracking sales returns and profit changes. With this, one can quantitatively prove the positive correlation between marketing investments and increased sales of the product.
- Effective inventory monitoring helps to save storage spending, as well as wastage of perishable products. One of the realistic measurements could be to set a 10% decrease of the wasted or not used inventory by the end of 2020, which is our forecast year.
- To expand and generalise the point above, another objective can be to cut down all unnecessary costs where the margin profit is not maximised. This can be done by analysing current costs and assigning realistic budget targets and tracking how many stores/cafe branches achieve the set fair targets. This requires frequent monitoring and support, including possible training of staff, and constant investigation by the relevant management level.

Assumptions

As there is limited information provided and background knowledge on the value of the variables provided on the dataset and the business targets for the business, I was going with the general assumption that the business's objective is profit maximisation and market monopolisation.

Secondly, as the data did not mention which currency was the monetary performance being measured in, I made an intelligent assumption of this being measured in GPB (£) in accordance to the business location and added to the data measurement.

Another assumption made was that COGS and the total expenses cover all expenditures made by business, such as cost of storage and location rent, staff salary, taxes and so on. As due to my limited specialisation in area of business financial modelling, it is unclear under what category these spending will be coming under. Another observation being made is that the COGS tend to be

consistently £5000 on average more than the total expenses, causing a confusion in data interpretation.

To go next step deeper, the profit calculation does not include any business loans being made to start off the business. Therefore, another assumption being made is that either the business has successfully paid back all the loans or did not have them in the first place.

Since the dataset only mentions drinks as part of the products, I made an assumption the coffee chain specialises on the drinks, such as hot drinks, only. However, usually coffee chains offer a set of desserts or snacks to go with the hot drinks, in addition to the cold drinks being offered.

Another assumption being made in the dashboard creation, that was mentioned earlier, is that there are three managerial layers in the company in total – CEO, Regional Manager and Store Manager. If I was to expand on the assumption and there was a chance of direct communication with the stakeholders, the dashboards would be expanded into one CEO Dashboard, Sales Team Dashboards by Sales, Profit and other relevant performance indicators, Marketing Team Dashboards (including Digital Marketing and Offline Marketing), Financial Analyst Dashboard. However, as mentioned above, since we do not have any information on the business employees and internal structure, the prototype dashboards were created for only most essential and basic roles in the company.

To expand further on the Marketing measure assumptions, the dataset does not provide with any information on the marketing strategies and medium in which it is being executed. Hence, we do not have enough data to compose a dashboard to investigate which marketing strategies are most useful for the company and marginally profitable or effective.

In addition to above statements, the dataset does not make it clear what is being meant by Inventory and what are the units of measurement being used. Inventory has negative values, assuming there were issues with stock availability.

Dashboard Elements

Calculations

For the dataset, I used those variables provided, as well as financial variables derived from using those given. For example, I calculated ‘Profits’ from the given Sales, COGS and Total Expenses values provided in the original dataset. However, since Lupita’s Café management is likely to have a better financial background, they are very like to find that more calculations can be done. From my research and limited understanding of measurement KPIs, the existing calculated fields are as follows:

- Profits (£k) = Sales – COGS – Total Expenses
- Margin (£k) = Sales – COGS
- True/False (Boolean) – Was Budget Sales met by actual Sales?
- True/False (Boolean) – Was Budget Profit met by actual Profit?
- True/False (Boolean) – Was Budget COGS met by actual COGS?

If I had to advice the management for further dashboard development, I would have advised, but not limited, the following calculations:

- Sales Target Margin = Sales – Target Margin
- Inventory Used (%) = (Sales / Inventory) * 100
- Inventory Not Used (%) = 100 – Inventory Used (%)

    - As noticed by the dataset values, this calculation can be affected by negative inventory values.
- Total COGS + Expenses

Filters

For the users to concentrate on a specific variable, for example of a 'City' or 'State' of choice, the user is advised to use filters offered on the dashboard. This can also be done by clicking the colour coded region and the dashboard will make sure to filter out all the aspects on the dashboard related to that variable. To make an example, if you select a certain region, you will be able to filter out all the data relevant to the performance to that region.

As per data display, I sorted out the data to be displayed by ascending or descending order where appropriate to make the graph more readable and easy to compare the performance of the regions, cities or the products offered by the business. This helps the users to clearly identify the issues and anomalies in the visualisations.

Another way of filtering the data is changing how each variable is represented statistically, for example whether it is 'Sum', 'Average', and so on to make the data visualisation appropriate to the story that is being told.

As per dashboard design, since we were not provided with the font style and any marketing material guidelines to match the dashboards style with, I proposed my own style to the dashboard and used Tableau Bold as the default font.

Colours

Additionally, I am using colour coded graphs, like in case of whether the actual performance was met by budget performance was color-coded in alerting colours. This being green for whether the target was met and red when otherwise. For other visualisations, I would use gradient colour shades for comparison of performance of different products (see Store Manager Level Dashboard), i.e. how much sales were each product bringing.

In case of color-coding regions, cities, and product, I aimed to keep the colours consistent across the dashboard to cause less confusion for the users.

Layout Design

As mentioned above, the dashboards would be productive if suitable for each managerial level without overloading irrelevant for them to take executive decision information. By this reasoning, my design decision was to allocate three dashboards as a **prototype** - one for CEO, one for Regional Management, following with Store Management. Although each management level is looking at sales and profit revenue, CEO is receiving a general image of profit performance by each region and profit forecast, whereas the Managers will receive a deeper drill down into causations of the profit performance and pass it on Store Manager to look at the variables, such as COGS (Cost of Goods Sold), staff productivity margin profit (as a potential variable to look into) and so on. As part of clear and concise design, I tried to use a few, but useful variable visualisations that the user can drill down if necessary. As explored later in storyboard, I applied Menu Dashboard for effective navigation between dashboards, should they be interested into looking to other dashboards.

The dashboards follow in logical order, expanding on the overview from the previous dashboard in hierarchical order, so that the Manager's dashboard overviews the data measurements, i.e. profit, behind those illustrated on CEO's dashboard. One of the tools to do that can be effective use of filters.

Storytelling Reasoning

For the company to make reasonable predictions and future strategy, they should look at current performance and the status of the company now. To put this into place, this can be done by exploratory analysis and visualising the financial performance trends. However, since the dataset is lacking some necessary variables for deeper analysis, like in case with it being unclear what the profit is exactly being made from and what is being accountable in it, the company is highly advised to provide further financial calculations that can be used as part of KPIs. Forecasts help to adjust targets and behaviour tactics by whether the company strategy is valid to carry on as it is or certain adjustments are essential to be made. One way to go about it is for the company to question themselves of 'what if?', then create clear goals according to these assumptions and create a strategy to achieve these goals. My aim, as a business analyst, is to help the company in designing appropriate dashboards to make this tracking process easier.

As mentioned before, the dashboards have been designed with the consideration for how much time each managerial level have for reviewing the dashboards. Therefore, C-Level (CEO) dashboards are unlikely to spend time drilling into small details and would rather have information of how profitable a region and branch is and whether it is worth keeping it open. In return, Regional Manager is likely to be interested to see the performance of each store and what improvement can be done to make it worthwhile its existence. And finally, Store Manager would be responsible for investigating the underlying factors of major KPI and margin performance. One of factors looked over by Store Manager can be, and not limited to, is overstock, hitting the set targets by drink sales, and the marginal cost of hired staff and the coffee shop opening hours (i.e. managerial points). As a side suggestion, this can be improved by regular knowledge exchange between the managers and clear objectives being set by the CEO.

Storyboard

To illustrate the draft layout of the dashboard, I have produced dashboard mock-ups. However, as these were developed before the dashboards were put into place, they may differ from the result as part of the process (please see the Appendix). As per verbal description, I tried to make the dashboards as visual as possible without the need to spend too much time into drilling down in the result. This, in return, gives a clear idea, in my opinion, of what they could do to improve their business. When composing the storyboards, I was considering to correct use of each graph, for example to use bar charts to represent categorical data and to make sure the pie chart does not use more than six different 'slices' or variables to keep the readability of the visualisation. Additionally, I aimed at using a variety of graphs to make the visualisation engaging and use appropriate font to make the dashboards com

General findings/analysis, conclusions and lessons learned

Although the dataset has a room for improvement from the financial analysis point of view, this has provided with enough information on the basic prototype visualisation for Lupita's Café. As the desired result, hopefully the prototype has convinced Mr. Razo and the rest of stakeholders of how both Excel and Tableau can be effectively used to achieve the desired development of the business.

From the analysis so far, the business is profitable, and the CEO is likely to feel safe into taking the business risk and keep expanding. However, it may be helpful to open extra position for another store manager to keep in control the inventory checks.

As I had no experience previously of working with financial reporting, the dashboards would be heavily advised to be treated as prototypes only and seek further improvement once the stakeholder's uptake some form of training. As a growing business, Lupita's Café is likely to be challenged looking into their IT infrastructure and the data management strategies.

For personal development, I appreciated the value of a clear and concise dataset and the importance of effective data visualisation to achieve the KPI set targets.

Appendix

Figure 1 – Menu Dashboard

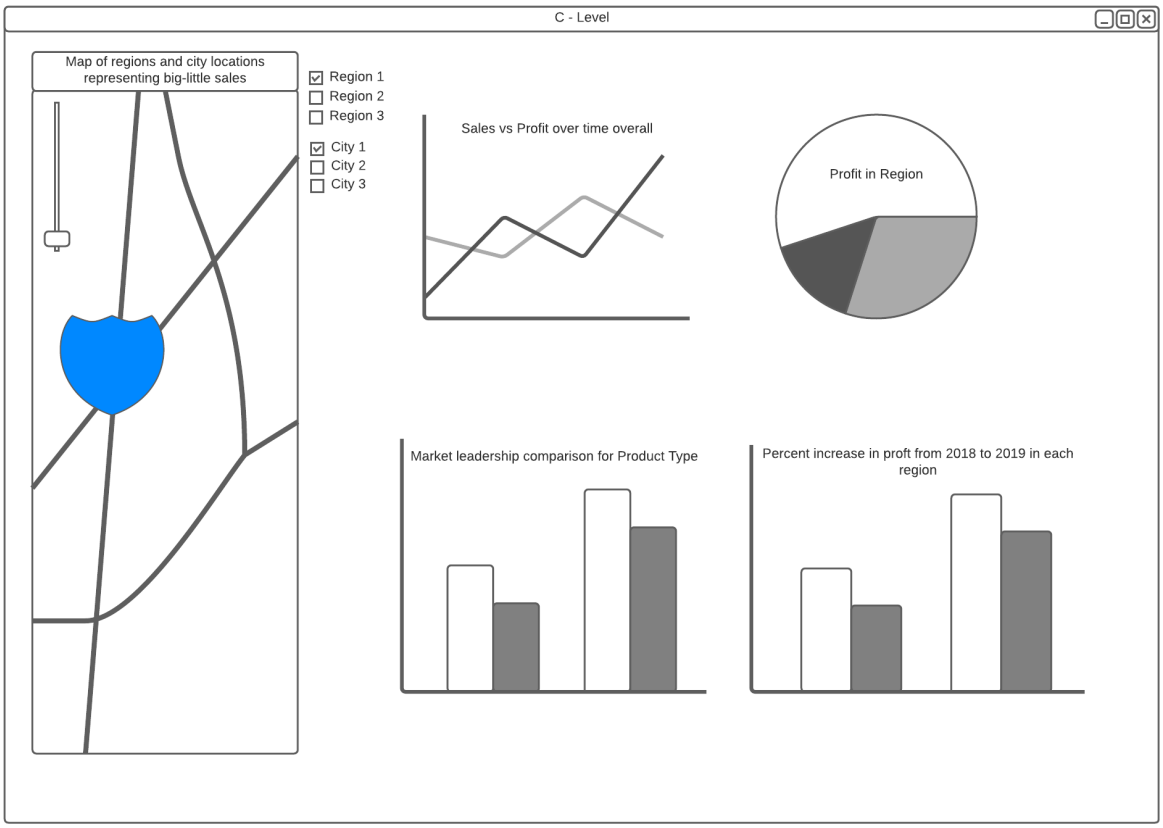

Figure 2 – C-Level Dashboard

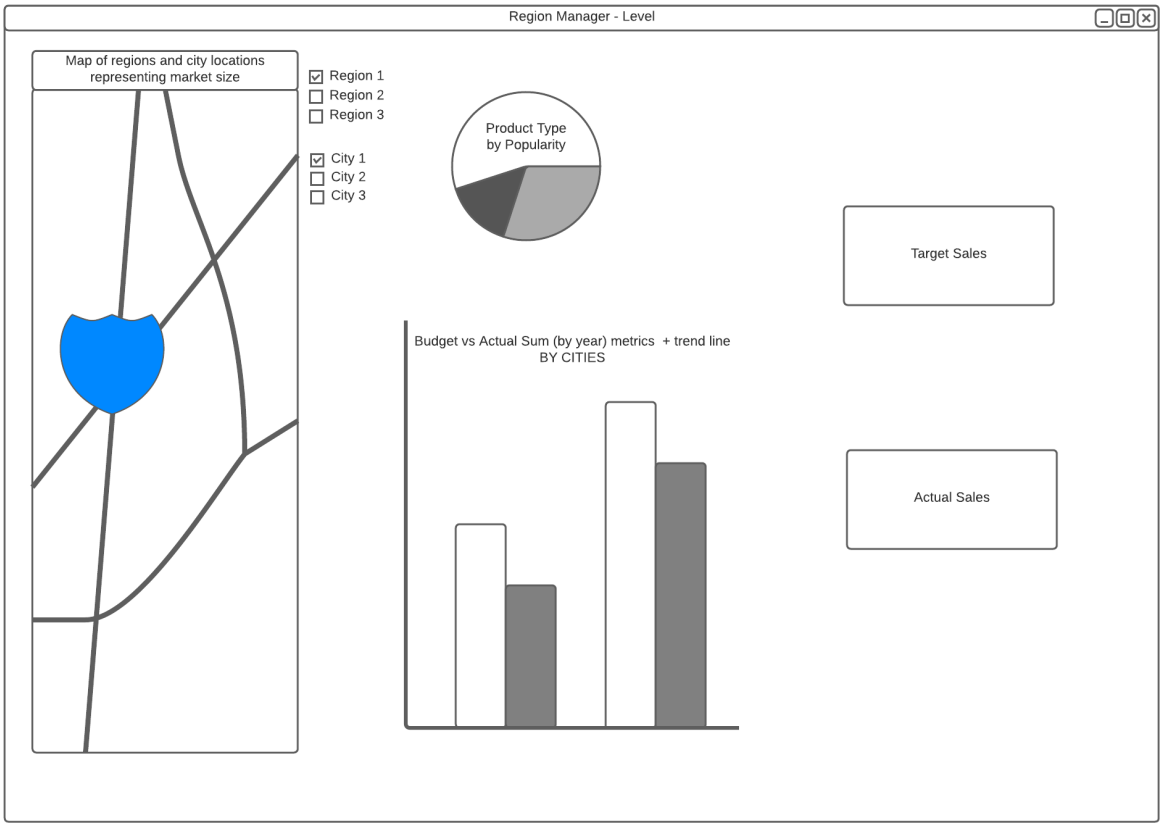

Figure 3 – Region Manager Dashboard