

# Business Analytics – MIS171

## Assignment 2

Trimester 2 2021

### DUE DATE AND TIME:

Due by 8:00 pm AEST Friday 13 August 2021

### PERCENTAGE OF FINAL GRADE:

20% of the final grade

### Learning Outcome Details

<b>ULO1:</b>	Apply quantitative reasoning skills to analyse business problems.
<b>ULO2:</b>	Create data-driven/fact-based solutions to complex business scenarios.
<b>ULO3:</b>	Implement contemporary data analysis tools to analyse business performance.
<b>ULO4:</b>	Interpret findings and effectively communicate solutions to business scenarios.

### Assessment Feedback:

Students who submit their work by the due date will receive their marks and feedback on Moodle on or before Monday 27 August 2021. Your assignment feedback will be returned in a rubric via Moodle with an overall mark together with comments. In order to understand the areas where improvement is required, students are expected to refer, and compare their answers to the suggested solutions and discuss further improvements with the teachers.

### General Description / Requirements

The assignment requires that you analyse a data set, interpret, draw conclusions from your analysis, and then convey your conclusions in a written report. The assignment must be completed individually. The assignment must be submitted by the due date electronically in Moodle using the assignment submission link (Turnitin).

When submitting electronically, you must check that you have submitted the work correctly by following the instructions provided in Moodle. Please note that we will NOT accept any hard copies or assignments submitted via email. The assignment uses the Microsoft Excel file '**Assignment 2 T2 2021**' which can be downloaded from Moodle.

The assignment must be completed individually.

The assignment focuses on materials presented up to and including Week 6.

# Scenario

## Real Value Pty Limited

### Real Value Pty Limited: Background

Real Value Pty Ltd is one of Australia's leading supermarket chains. Originating from a family-based chain of general stores, Real Value Pty Ltd now has supermarkets all over Australia. Each state capital has a company office. The planning and direction of the operations take place in the Head Office in Melbourne. A principal role of the Research and Development department in the Melbourne office is to provide statistical advice on matters affecting,

- i. The sales of the company,
- ii. The actively operating stores and operating hours,
- iii. Employee contributions to sales and
- iv. Competitors

You (Erica Brown) are one of the leading analysts in the department. You have received an email from the Director of Analytics (Manny Brooks), that contains specific questions that you must answer and report back to Manny.

### **Your report must include two files:**

1. An Excel file, which will include:
  - your analysis ( answering Manny's specific requests),
  - the interactive dashboard to be used by the CEO.

Additional analysis will not be marked. However, you can perform additional analysis if it will improve your report or dashboard.

2. A Word file, which will include your report to Manny.

### **Data file**

Manny has provided you with an Excel data file of a random sample of 150 stores operated in the financial year 2019/20. The file includes a Data Description tab that describes the different data fields in the sample (and some data fields which you will need to create from the numeric data provided):

Variable	Description
Sales \$m:	Total Sales for each supermarket for the financial year. \$ Million.
Wages \$m:	Total Wage and salary bill for the financial year. \$million
No. Staff:	The number of effective full-time staff employed on a weekly basis.
Operating level	If number of staff is : (0-49.9 = Less active, 50-74.9 = Moderately active, 75-150 Highly active)
State:	Stores surveyed in different states
	TAS = Tasmania NSW = New South Wales VIC = Victoria QLD = Queensland
Age (Yrs):	The number of full years of operation of the store.
GrossProfit:	Gross Profit for each supermarket for the financial year. \$000.
Adv.\$'000:	Advertising and promotional expenses for the financial year, \$'000
Competitors:	The number of competing supermarkets in the consumer catchment area
HrsTrading:	The total number of hours open for trading per week

## Email from the Director of Analytics

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To: Erica Brown

From: Director of Analytics, Manny Brooks

Subject: Analysis of the provided data set

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Dear Erica,

At the recent board meeting, the directors have decided to initiate certain business analyses on a survey conducted three months ago. As one of the leading analysts, can you perform the following analysis and provide a report?

1. The Sales is the most important measure for Real Value Pty Ltd. Provide details of the average sales in the different operating levels (*Less active, moderately active, highly active*).

*Approach:*

- *Create a variable called "Operating level" by converting the numerical variable "No. staff" to a categorical variable based on the information provided in the Data Description sheet and the above table,*
- *Create suitable tables of summary statistics of the variable Sales and at least one graph*
- *Calculate a 90% confidence interval for average sales for each operating level.*
- *in the "Conclusion" section write a (one sentence) conclusion for each Sales category (e.g., "I am 90% confident...").*

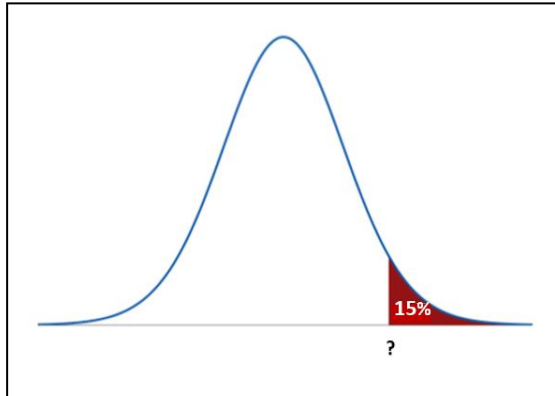
2. Are there any differences in the overall proportion of stores surveyed in different states? That is, is there any state sampled proportionally more than any other state?

*Approach:*

- *Calculate the proportion of the number of stores surveyed in TAS, NSW, VIC, and QLD*
- *Produce the relevant tabulated summary statistics and graph(s).*
- *Calculate, compare and contrast, 90% confidence interval estimates for the proportion of stores in TAS, NSW, VIC, and QLD. Make sure that you interpret your findings.*
- *In the Conclusion section, write a (one sentence) conclusion for each State (e.g., "I am 90% confident...").*
- *In the Conclusion section, in one sentence, answer the question "Is there any state that is represented proportionally more (or less) than the others?"*

3. Assuming that the Profit is approximately normally distributed, answer the following questions:

- What is the probability that the Profit of a randomly selected store from each state (TAS, NSW, VIC, and QLD), exceeds \$200,000?
- What is the probability that the Profit of a randomly selected store from each state (TAS, NSW, VIC, and QLD) would be less than \$70,000?
- What is the minimum value of Profit that will be earned by the top 15% of the stores in each of the 4 states (TAS, NSW, VIC, QLD)?



Please note that this diagram is only related to **part c** of this question

*Approach:*

*Q.3(a):*

- Produce descriptive summary statistics for profits in each state TAS, NSW, VIC, QLD and find relevant information to apply for the probability calculations.*
- For each state (TAS, NSW, VIC, QLD) calculate the probability of Profit exceeding \$200,000*
- In the Conclusion section write a (one sentence) conclusion for each state's profit (e.g. "The probability that the profit...").*

*Q3(b)*

- For each state (TAS, NSW, VIC, QLD) calculate the probability of Profit less than \$70,000*
- In the Conclusion section write a (one sentence) conclusion for each state's profit (e.g. "The probability that the profit...").*

*Q3(c)*

- For each state identify the relevant z-score and use it to calculate the respective profits,*
- In the Conclusion section write a (one sentence) conclusion for each state (e.g. "The profit for.....").*

4.a. It has been suggested at our most recent meeting that the average Profit of the 4 states TAS, NSW, VIC, QLD are now more than \$125,000. Does this data confirm this hypothesis? (Use 5% level of significance)

*Approach:*

- Use a 5% Level of Significance ( $\alpha = 5\%$ )*
- Conduct appropriate hypothesis test for Profit of each state (ACT, NSW, NT, QLD).*
- In the Conclusion section write a (one sentence) conclusion for profit (e.g., "At a 5% level of Significance...").*

4.b. Further, is there sufficient evidence to conclude that the proportion of profits in each state TAS, NSW, VIC, QLD is NOT 35% of all the profits?

*Approach:*

- Conduct the appropriate hypothesis test for each state ACT, NSW, NT, QLD,*
- In the Conclusion section write a (one sentence) conclusion for each state ACT, NSW, NT, QLD (e.g., "At a 10% level of Significance..."),*

- *Include an interactive Dashboard to explore the performance of Hours trading, Wages and Advertising expenses.*

## Dashboard

Please produce an interactive Dashboard, which the CEO can use to understand and visualise key data and to drill down into the data. I will leave the design details to you.

I look forward to your response and the Dashboard

Sincerely,

Manny Brooks

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## Assignment instructions

The assignment consists of three parts:

### Part 1: Data Analysis

When conducting the analysis, you will apply techniques from descriptive analytics, visualisations, probabilities, and confidence interval calculation. Hence, you will use various tables, graphs, and summary measures. When exploring data, we often produce more results than we eventually use in the final report, but by investigating the data from different angles, we can develop a much better 'feel' for the data: a deeper understanding of the data.

- Always ensure that you consider relevant modelling assumptions such as considerations of the level of measurement of the variable, the method of sampling, the shape of the population distribution, and the sample size.
- The analysis section you submit should be on Q1 to Q4 sheets of the Excel file.
- Where possible, it is always useful to produce both numerical and graphical statistical summaries as sometimes, something is revealed in one that is not obvious in the other.
- Your analysis should be clearly labelled and grouped around each question.
- Poorly presented, unorganised analysis, or excessive output will be penalised.

### Part 2: Email

You are required to reply by email, detailing,

1. your understanding about the contributions made by the different operating levels as per requirement 1 in part (a) above and any suggestions or recommendations that you may provide for improvements.
2. any comments that you are able to make on the differences in the overall proportion of stores in different states surveyed as per the requirement 2 in part (a) above.

You are allowed no more than 2 pages to cover your written conclusions. Please use the font size 11 (Arial), 1.5 line spacing and leave a margin of 2.54 cm.

### Please consider the following dot points very carefully.

- Keep the English simple and the explanations succinct. Avoid the use of technical statistical jargon.
- Your reader will not necessarily understand complicated statistical terms, thus your task is to convert your analysis into plain, simple, easy to understand language.
- The email is to be written as a stand-alone document. Thus, you should not have any references in the email to your analysis, nor should you include any charts and tables in your email.

- Use an email format for your reply. That means the email heading (e.g. To: From: Subject :) should be included, the recipient should be addressed at the beginning and the signature or name of the sender should be included at the end.
- When composing your reply, make sure that you actually answer the questions asked.
- Do not copy the questions in the email.
- Sequentially number your answers in both your email and your analysis (1, 2 ...) to match the email.
- Include a simple introduction at the start of the email and a summary/conclusion at the end.
- Marks will be deducted for the use of technical terms, irrelevant material, poor presentation / organisation / formatting and emails that are over two pages long or copy questions in the email.

When you have completed the email, it is a useful exercise to leave it for a day, return to it and re-read it as if you knew nothing about the analysis.

- Does it flow easily?
- Does it make sense?
- Can someone without prior knowledge follow your written conclusions?  
Often on re-reading, you become aware that you may have made some unclear points, and find that you can re-phrase them much more clearly.

### **Part 3: Interactive Dashboard**

The minimum requirement is a neat, functional, interactive dashboard. It is expected that the dashboard includes 4 or 5 interactive graphs/tables.

The Microsoft Excel file should contain a separate sheet for the interactive Dashboard.

The following questions will help guide you in designing an interactive dashboard.

- What are the most appropriate visualisations for the dashboard?
- What about the choice of colour?
- How can I make the dashboard interactive?

### **Submission Instructions**

Your submission will comprise of two files:

1. Your report in Microsoft Word format.
2. A Microsoft Excel workbook file (Containing: Your Analysis including all the graphs, charts etc.).
3. Submission should have the following format: MIS171\_T2\_StudentID.doc (or .docx) and MIS171\_T2\_StudentID.xls (or .xlsx).
4. This assessment is to be submitted ONLINE ONLY into the Assessment 2 Turnitin link available on the MIS171 Moodle site.
5. All work you submit is checked electronically or by other means to detect potential collusion and/or plagiarism.
6. When you are required to submit an assignment through Moodle (Turnitin link), you will receive an instant notification on the screen confirming that it has been submitted.

### **Notes**

#### **Penalties for late submission:**

The following marking penalties will apply if you submit an assessment task after the due date without an approved extension:

- 5% will be deducted from available marks for each day up to five days, and work that is submitted more than five days after the due date will not be marked and you will receive 0% for the task.
- 'Day' means working day for paper submissions and calendar day for electronic submissions.
- The Unit Coordinator may refuse to accept a late submission where it is unreasonable or impracticable to assess the task after the due date.
- For more information about academic misconduct, special consideration, extensions, and assessment feedback, please refer to the unit outline or Deakin College student portal.

## **Requests for Extensions:**

Students who are unable to submit an assignment by the due date, due to exceptional circumstances, may contact the Unit Coordinator ([dilini.eriawala@deakin.edu.au](mailto:dilini.eriawala@deakin.edu.au)) to discuss options. Please submit evidence of the progress on your analysis and the extension request via email.

Before contacting the Unit Coordinator, you must obtain appropriate documentation to support your request. You must be able to demonstrate exceptional circumstances.

All requests must be made prior to the due date.

Good luck!