



Assignment

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TASK 1

Plan for Data Collection for a Given Business Problem

Tesco PLC is a famous British multinational grocery retailer (Ferne et al., 2010). It has implemented several strategies for retaining its customers and attracting new individuals towards the grocery stores (Saeed, 2016). The implementation of self-checkout cashiers is one of the advanced systems focused by this organisation in its decision-making process (Lowe & Wrigley, 2010). A business problem that can be identified in its internal change management in the form of self-checkout cashiers is associated with the customer satisfaction (Gustafsson et al., 2005). For example, customers might have both positive and negative perceptions about this system because of less time-consuming process (The Pros and Cons of Using Self-Checkouts, 2013). Thus, this research aims to develop an understanding of the impact of self-checkout cashiers on customer satisfaction at Tesco PLC.

In order to evaluate this business problem and conduct a study, planning of data collection is a significant aspect (Ghauri, 2004). A quantitative data would be used that have attributes of the quality of a process or decision and intended to obtain specific responses. Quantitative data is selected because it provides exact information about the impacts of the self-checkout cashiers on customer satisfaction (El Mahboul, 2014) because the responses are based on close-ended options of one to two words.

Data would be gathered through both the primary and secondary methods (Bryman, 2006). The researcher would collect primary data through a structured close-ended questionnaire consisting of 20 questions, which would assist in making a significant understanding about customers' perception towards the system. To keep a generalisable sample, the population size assumed for this research would be ranging from 200-500 since the customers of Tesco PLC are numerous. Customers of all ages, gender, race, social class and educational background would be approached using convenient sampling. On the other

hand, since secondary data assists in supporting firsthand information (Smith, 2008), published articles and reports of the organisation and books related to customer satisfaction in order to understand the factors that satisfy them would be used as a source of data collection (BMS, 2013). However, this information would be modified, as it cannot be used directly due to the plagiarism issue. The ignorance of internal source of data collection is because of its limited coverage of information related to the company (Sreejesh et al., 2014).

Survey Methodology

The developed plan outlining the primary collection of data can be accomplished by selecting the most appropriate methodology to gather the information. As this research has been decided to be conducted in order to find the impact of self-checkout cashiers' system on customer satisfaction at Tesco PLC; thus, it would be convenient to know the personal opinions of customers. Therefore, close-ended questionnaire would be constructed as an equipment, as it assists in obtaining the individuals' opinion towards the concerned change (Reja, 2003). In this survey, participants would be asked to fill the questionnaire. For this purpose, a sampling technique would be applied, which shows the representative of the market segment (Wedel & Kamakura., 2012). At the same time, it has several benefits including time saving, money saving, and designing of surveys (Thach & Olsen, 2006).

The sampling framework beneficially used in this study would be the systematic (random) sampling in which all those respondents are selected, who are included in the list of regular intervals (Kothari, 2004). For instance, the concerned study includes every fourth customer, who buys grocery items of the organisation. A large sampling size (approximate 200-500) would be used to carry out the firsthand data collection method since it reduces the sampling errors associated with the unnecessary information (Button, 2013).

Questionnaire

A questionnaire is considered as the most significant method of gathering primary data, as it is a timesaving process (Bryman & Bell, 2015). Therefore, this has been selected for the investigation of the self-checkout cashiers at Tesco PLC. However, a short and closed-ended questionnaire would be intended as site survey to help gather information based on the defined problem. It would be designed to elicit to ensure comparability. In this questionnaire, general questions would be asked that would help in interpreting the results. However, these questions would be logical (ignoring the demographic questions), and unbiased. On the other hand, a Likert scale would be used to provide the options to the customers in order to fill the questionnaire about fundamental ideas. The designed questionnaire for the given business problem is as follows:

Close-Ended Questionnaire for Customers

1. Time and waiting-line problems mainly you face when go for the shopping.
 - a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
2. These problems exist in the Tesco PLC
 - a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree

- f. Strongly disagree
3. Tesco PLC implemented a new self-checkout cashiers system and it is significant in reducing my problems of time-consuming and waiting-line
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
4. It works quickly compared to previous systems
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
5. It is helpful for all customers
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
6. This kind of system reduces the time duration of shopping.
- a. Strongly Agree

- b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
7. I am satisfied with the self checkout cashier system of Tesco
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
8. I am in favour of this system
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree
 - e. Disagree
 - f. Strongly disagree
9. According to you, minimisation in waiting line and cash checking errors are the major benefits customers can enjoy after implementing this system.
- a. Strongly Agree
 - b. Agree
 - c. Slightly Agree
 - d. Slightly disagree

- e. Disagree
- f. Strongly disagree

10. I prefer to use self-checkout cashiers' service

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

11. I have complete information and awareness about the system

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

12. Self-checkout cashiers system motivates me towards shopping at the concerned organisation?

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

13. I have experienced anything bad about this self-checkout system in the organisation

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

14. It is highly beneficial for the customers

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

15. The biggest disadvantage of the system is that it may have mechanical error or disturbance

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

16. I have found any disturbance in the self-checkout system of Tesco PLC

- a. Strongly Agree
- b. Agree
- c. Slightly Agree

- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

17. Mechanical errors in the self-checkout cashiers system negatively affect the customers

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

18. Self-checkout cashiers system is motivating you towards the concerned organisation

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

19. This system has reduced your tension of shopping that takes a huge time

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

20. The presence of customers increases with the use of this kind of system in an organisation

- a. Strongly Agree
- b. Agree
- c. Slightly Agree
- d. Slightly disagree
- e. Disagree
- f. Strongly disagree

TASK 2

Mean

Amount Spent	No. of Customers	Mid point	F*x
10-20	18	15	270
20-30	20	25	500
30-40	16	35	560
40-50	14	45	630
50-60	12	55	660
60-70	8	65	520
70-80	6	75	450
80-90	4	85	340
90-100	2	95	190
	100		4120

$$X = \frac{\text{£ (fx)}}{\text{£f}}$$

$$X = \frac{\text{£ (4120)}}{100}$$

$$X = 41.2$$

Median

Amount Spent	No. of Customers	Mid point	Class boundary	Cf
10-20	18	15	9.5-20.5	18
20-30	20	25	20.5-30.5	38
30-40	16	35	30.5-40.5	54
40-50	14	45	40.5-50.5	68
50-60	12	55	50.5-60.5	80
60-70	8	65	60.5-70.5	88
70-80	6	75	70.5-80.5	94
80-90	4	85	80.5-90.5	98
90-100	2	95	90.5-100.5	100
	100			

$$\text{Median} = L + \frac{(n/2) - B}{G} \times W$$

$$\text{Median} = 50.5 + \frac{(100/2) - 80}{12} \times 11$$

$$\text{Median} = 50.5 - 27.5$$

$$\text{Median} = 23$$

Mode

Amount Spent	No. of Customers	Mid point	Class boundary	Cf
10-20	18	15	9.5-20.5	18
20-30	20	25	20.5-30.5	38
30-40	16	35	30.5-40.5	54
40-50	14	45	40.5-50.5	68
50-60	12	55	50.5-60.5	80
60-70	8	65	60.5-70.5	88
70-80	6	75	70.5-80.5	94
80-90	4	85	80.5-90.5	98
90-100	2	95	90.5-100.5	100
	100			

$$\text{Mode} = L + \frac{f_m - f_{m-1}}{(f_m - f_{m-1}) + (f_m - f_{m+1})} \times w$$

$$\text{Mode} = 20.5 + \frac{20-18}{(20-18) + (20-16)} \times 11$$

$$= 20.5 + (2/6) \times 11$$

$$= 20.5 + 3.6$$

$$\text{Mode} = 24.1$$

Range

$$\text{Range} = \text{Max Value} - \text{Min Value}$$

$$\text{Range} = 20 - 2$$

$$\text{Range} = 18$$

Standard Deviation

x	$(x - \bar{x})^2$	$(x - \bar{x})^2$
18	$(18 - 10.4)^2$	57.76
20	$(20 - 10.4)^2$	92.16
16	$(16 - 10.4)^2$	31.36
14	$(14 - 10.4)^2$	11.56
12	$(12 - 10.4)^2$	2.56
8	$(8 - 10.4)^2$	5.76
6	$(6 - 10.4)^2$	19.36
4	$(4 - 10.4)^2$	40.96
2	$(2 - 10.4)^2$	70.56

$$\text{SD} = \sqrt{\frac{\sum(x - \bar{x})^2}{N}}$$

$$SD = \sqrt{\frac{\Sigma(57.76+93.16+31.36+11.56+2.56+5.76+19.36 + 40.96+70.56}{9}}$$

$$SD = \sqrt{\frac{331.92}{9}}$$

$$SD = 6.1$$

Percentile

Amount Spent	No. of Customers	Class boundary	Cf
10-20	18	9.5-20.5	18
20-30	20	20.5-30.5	38
30-40	16	30.5-40.5	54
40-50	14	40.5-50.5	68
50-60	12	50.5-60.5	80
60-70	8	60.5-70.5	88
70-80	6	70.5-80.5	94
80-90	4	80.5-90.5	98
90-100	2	90.5-100.5	100
	100		

25th Percentile (Lower Quartile)

$$P = \frac{i(N)}{100} \text{ th value}$$

$$P = \frac{25(100)}{100} \text{ th value}$$

$$P = 25\text{th value}$$

$$P = l + \frac{h}{f} \left(\frac{25n}{100} - c \right)$$

$$P = 20.5 + \frac{11}{20} \left(\frac{25 * 100}{100} - 18 \right)$$

$$P = 20.5 + 3.85$$

$$P_{25} = 24.35$$

75th Percentile (Upper Quartile)

$$P = \frac{i(N)}{100} \text{ th value}$$

$$P = \frac{75(100)}{100} \text{ th value}$$

$$P = 75\text{th value}$$

$$P = l + \frac{h}{f} \left(\frac{75n}{100} - c \right)$$

$$P = 50.5 + \frac{11}{12} \left(\frac{75 * 100}{100} - 68 \right)$$

$$P = 50.5 + 6.41$$

$$P_{75} = 56.91$$

Use of Percentile

For the estimated percentile in the defined scenario, it shows that this 56.91% of the competitors of Mr. Rahim are not stable enough to reach the level of his company. However, it is necessary for him to increase these figures in order to be more successful than the rest of the competitors and present a 90th percentile. This is why, his company needs to implement measures that would contribute in increasing this value for better future performance.

Inter-Quartile Range

The inter-quartile range is from 56.91 (Upper Quartile) to 24.35 (Lower Quartile).

Correlation Coefficient

Based on the provided additional information, correlation coefficient has been calculated through the following steps.

	Discount (%) (x)	Sales (units) (y)	xy	x ²	y ²
	1	20	20	1	400
	4	40	160	16	1600
	6	50	300	36	2500
	6	55	330	36	3025
	10	60	600	100	3600
	12	70	840	144	4900
	13	80	1040	169	6400
	14	90	1260	196	8100
	15	100	1500	225	10000
Sum Σ	81	565	6050	923	40525
N = 9					

$$r = \frac{n (\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

$$r = \frac{9 (6050) - (81)(565)}{\sqrt{[9 (923) - (81)^2][9 (40525) - (565)^2]}}$$

$$r = \frac{8685}{\sqrt{[1746][45500]}}$$

$$r = \frac{8685}{\sqrt{79,443,000}}$$

$$r = \frac{8685}{\sqrt{79,443,000}}$$

$$r = \frac{8685}{8913.0802}$$

$$r = 0.974$$

Interpretation

The low value of the standard deviation identifies that the data points of the discussed company are closer to the mean of the data set. This means that the data is highly concentrated, hence the stability for the mentioned shop, Whitechapel. His profit margin can be indicated stable and good performance as an outcome of the business. However, in order to maintain this performance in future, he needs to increase the quantity of customers for more profit margin.

Advantages for a Business

The correlation coefficient calculated above is $r = 0.974$. In terms of the discussed scenario for Mr. Rahim, this value indicates a strong linear relationship amongst the defined variables of Sales and Discount. This is depicted as positive correlation and 97.4% indicates that the relationship existing between the two variables is positive and it is closer to perfect correlation of +1, i.e. 100%. Both variables are increasing together and are moving in the same direction. In addition, both have the same magnitude. This becomes an advantage for Mr. Rahim because it means that items that have been set with higher discounted prices are being sold in bulks, hence the increase in sales and discount altogether. In turn, this would increase the profits for Mr. Rahim. This would provide more opportunities in enhancing business strategies for better performance and maintaining that in future for Mr. Rahim.

However, simply relying on advertising cannot provide better performance at all times and lack of advertising can damage the current reputation as well. It is necessary for Mr Rahim to analyse these factors and process the operations of his business through applying different promotional strategies for maintaining the increase in sales.

TASK 3**Part a**

The following are separate line graphs for the advertising and sales figures described above:

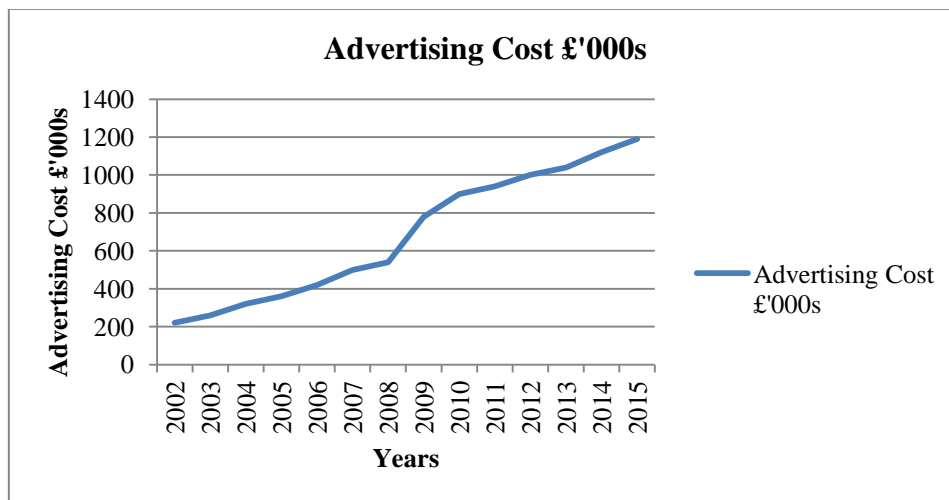


Figure 1 Advertising Cost Line Graph

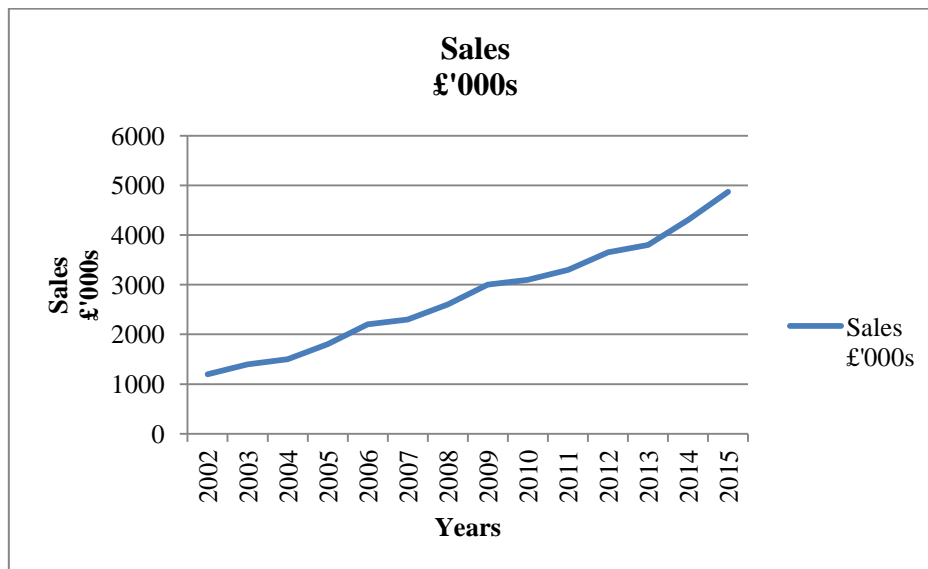


Figure 2 Sales Line Graph

The following line graphs show a comparison amongst the advertising and sales figures described in the tables,

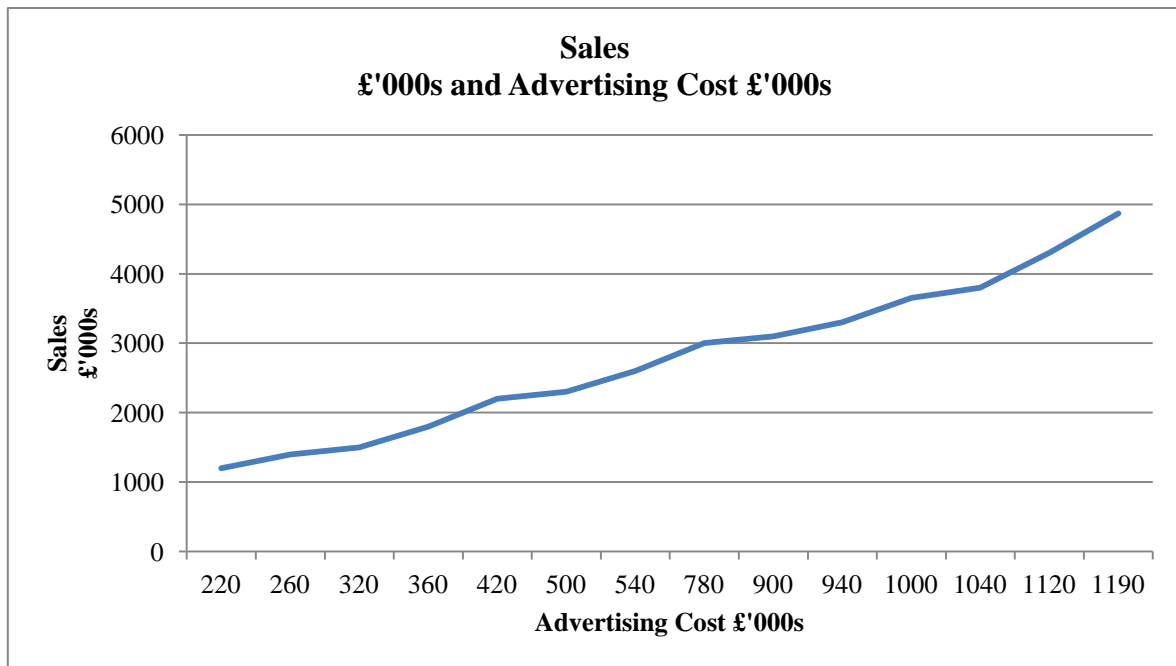


Figure 3 Line Graph between Sales and Advertising

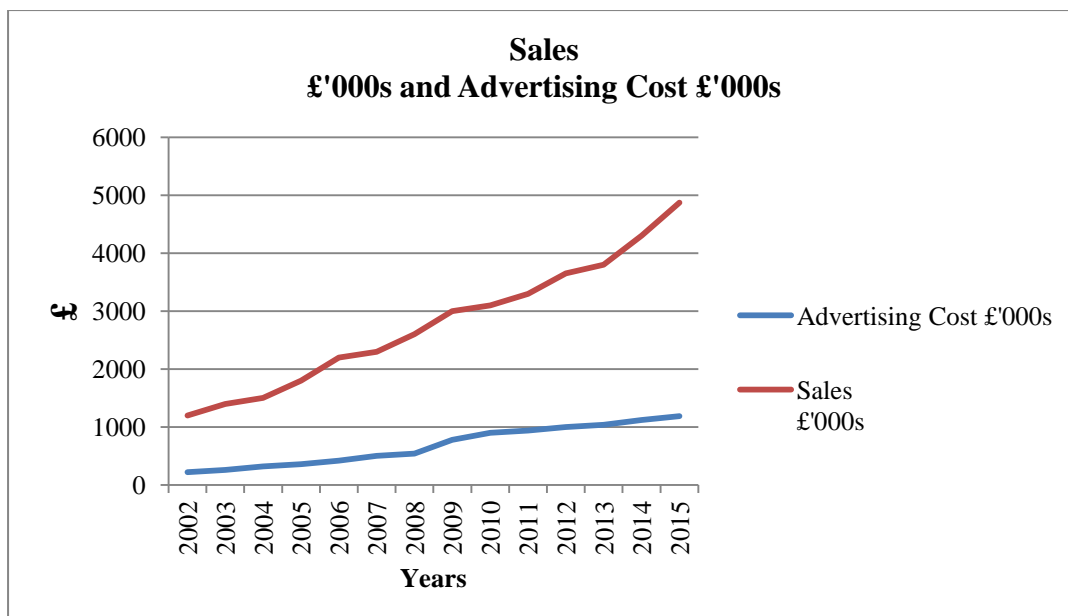


Figure 4 Comparing Figures of Sales and Advertising (Line Graph)

The following figures indicate pie and bar charts for the figures mentioned in table 2,

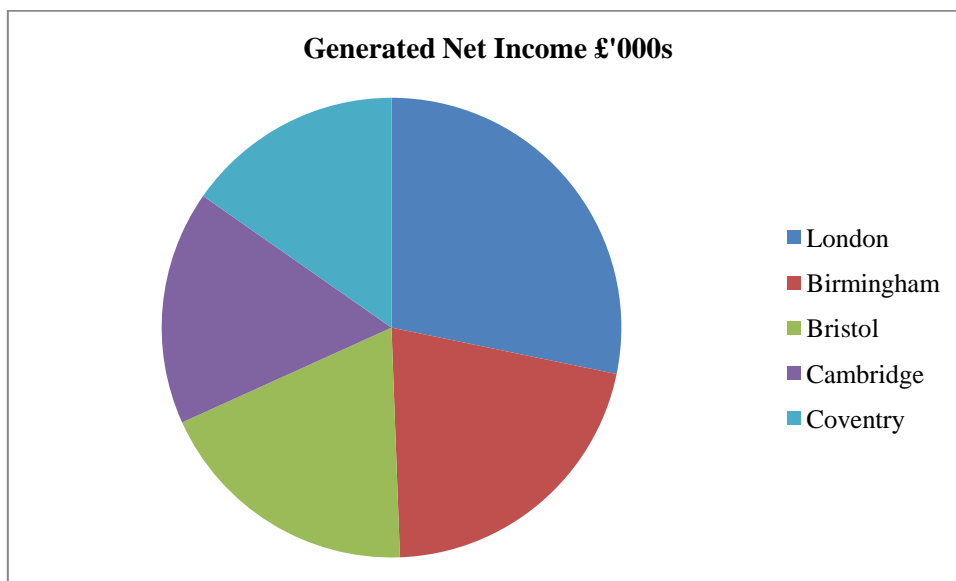


Figure 5 Generated Net Income Pie Chart

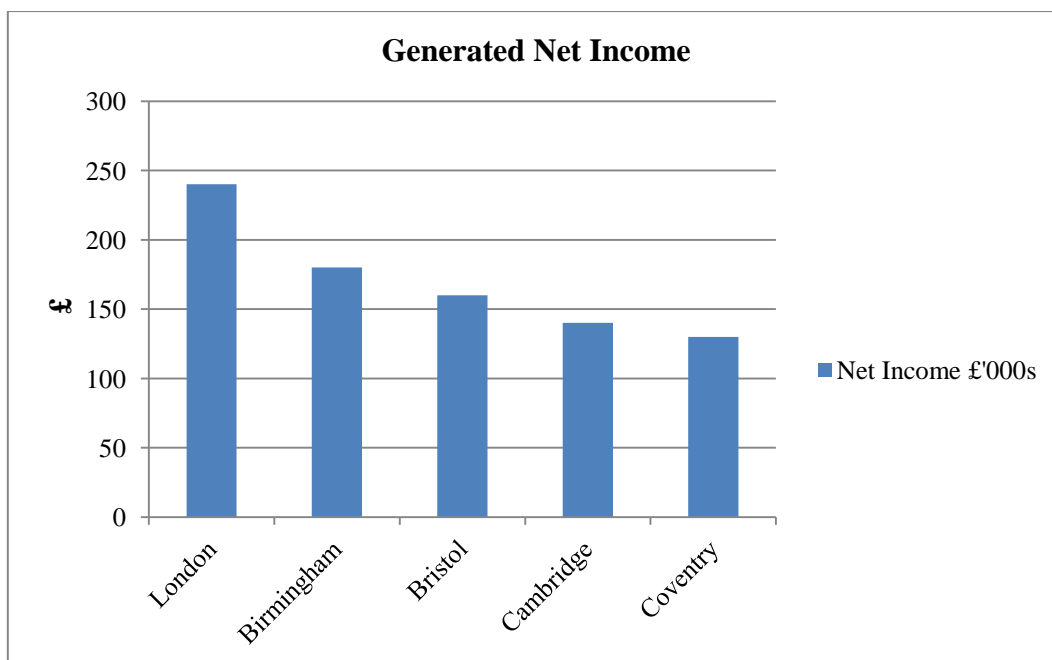


Figure 6 Generated Net Income Bar Chart

This part of the report indicates scatter graphs for the figures of advertising and sales.

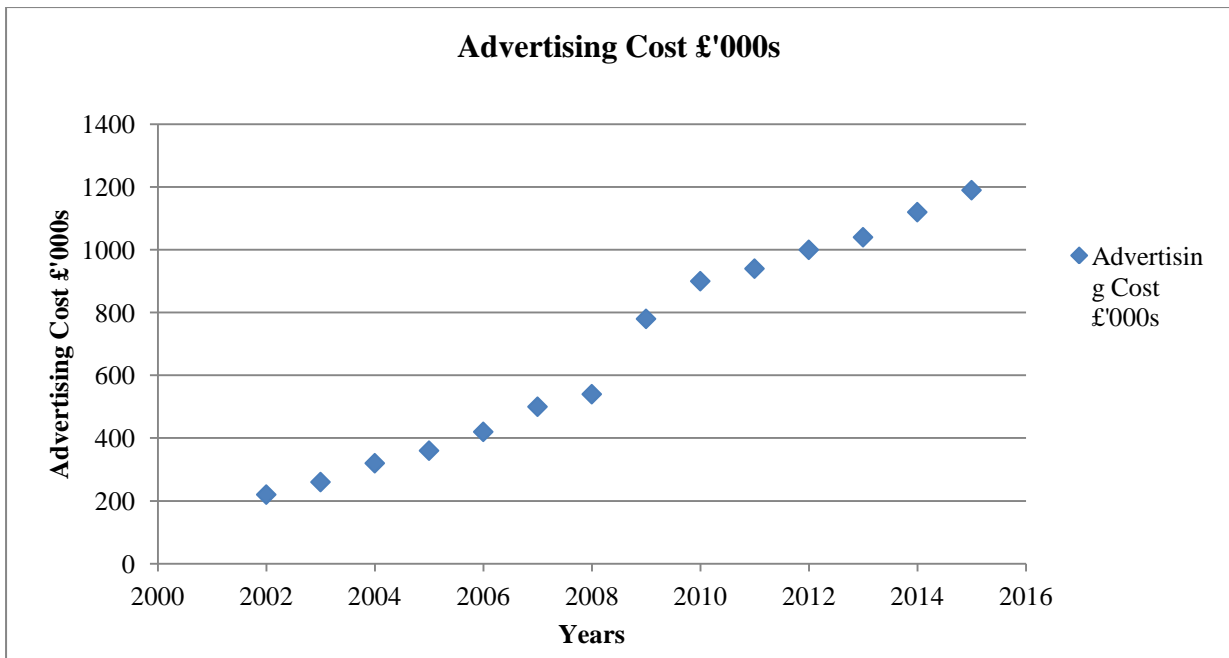


Figure 7 Advertising Cost Scatter Graph

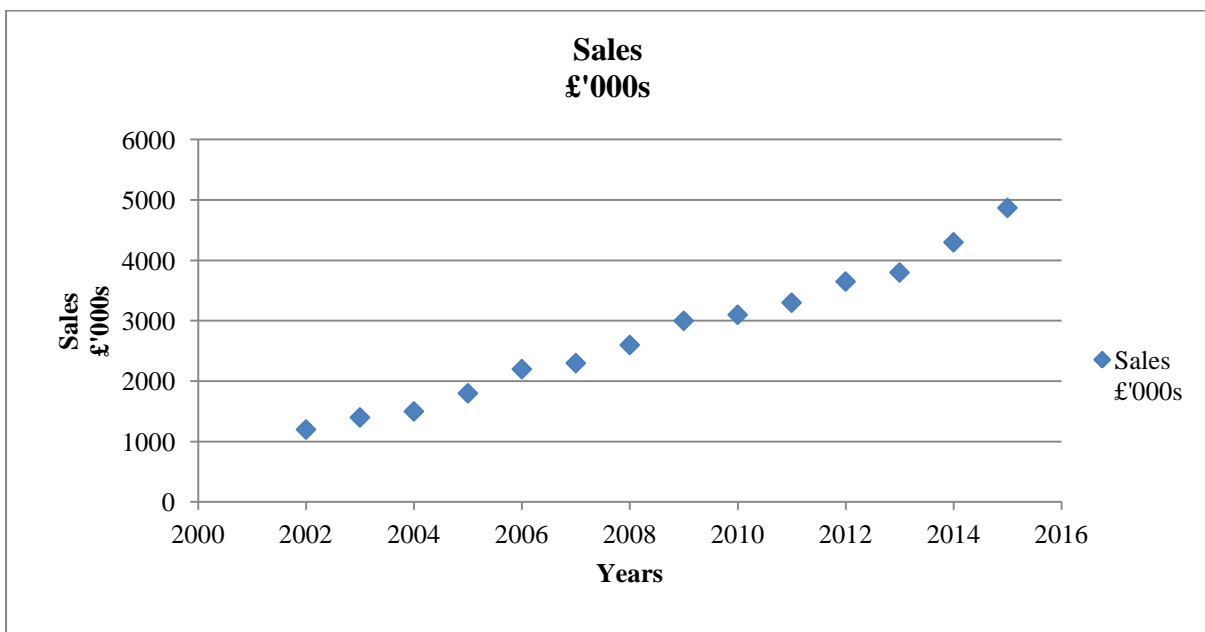


Figure 8 Sales Cost Scatter Graph

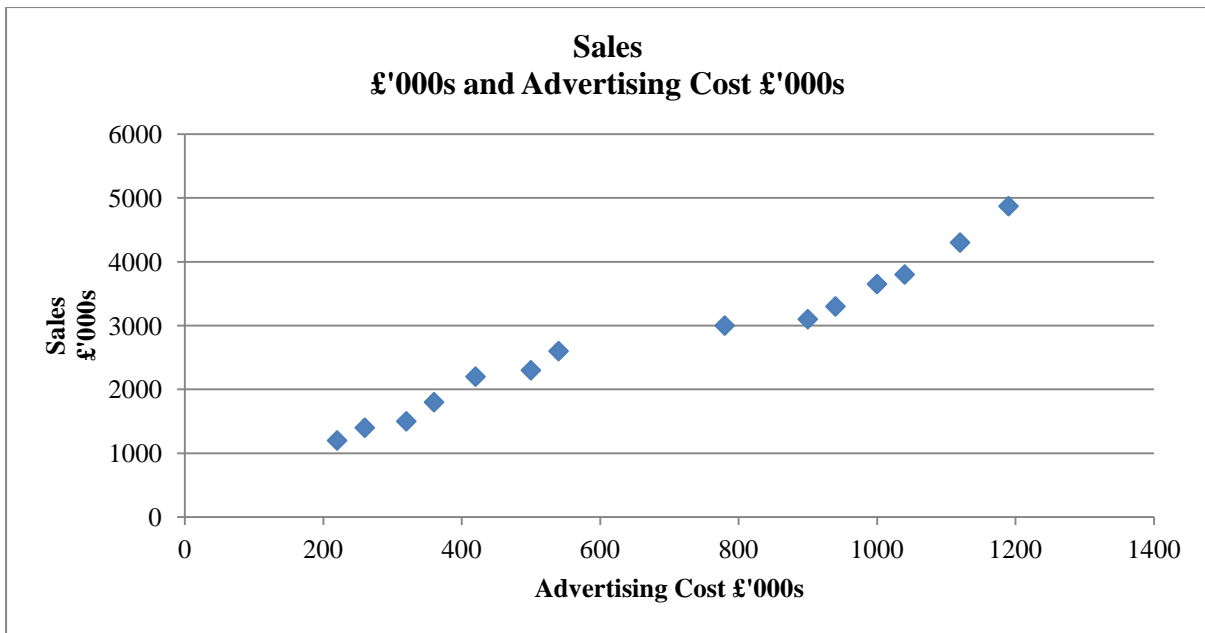


Figure 9 Scatter Graph Line Graph between Sales and Advertising

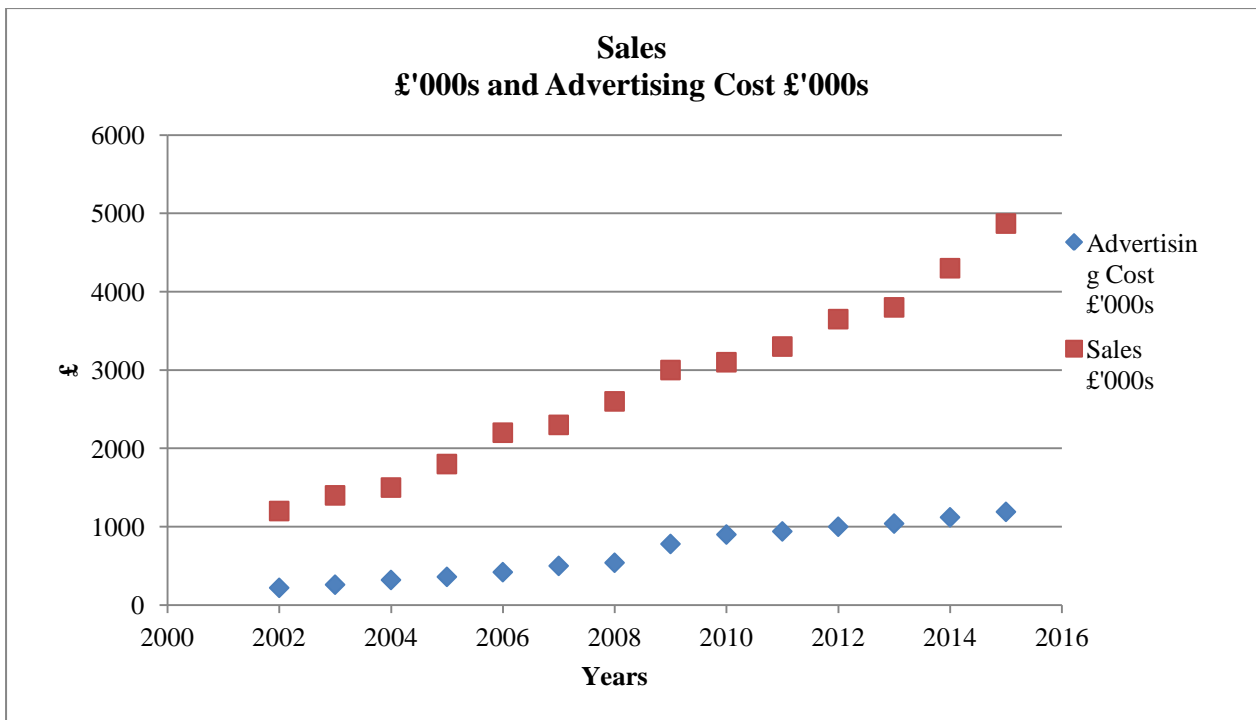


Figure 10 Comparing Figures of Sales and Advertising (Scatter Graph)

Part b

The following figures indicate trend lines on the previously made scatter graphs in order to assist in the forecasting sales figures for the years of 2016-2014.

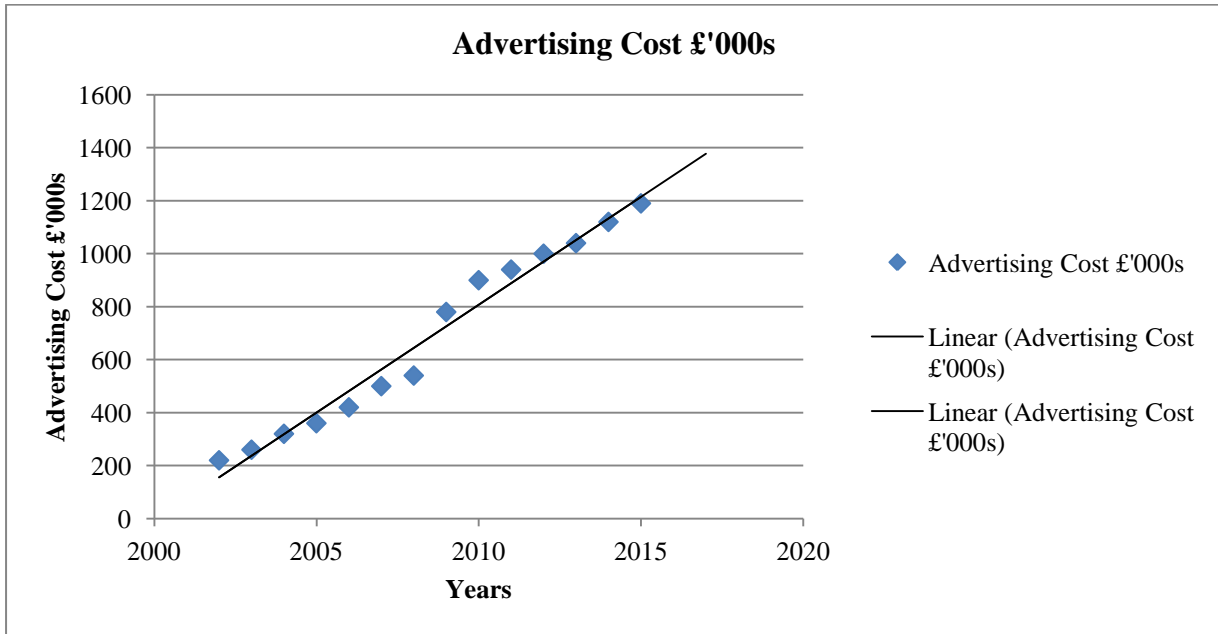


Figure 11 Trend Line for Advertising Cost Scatter Graph

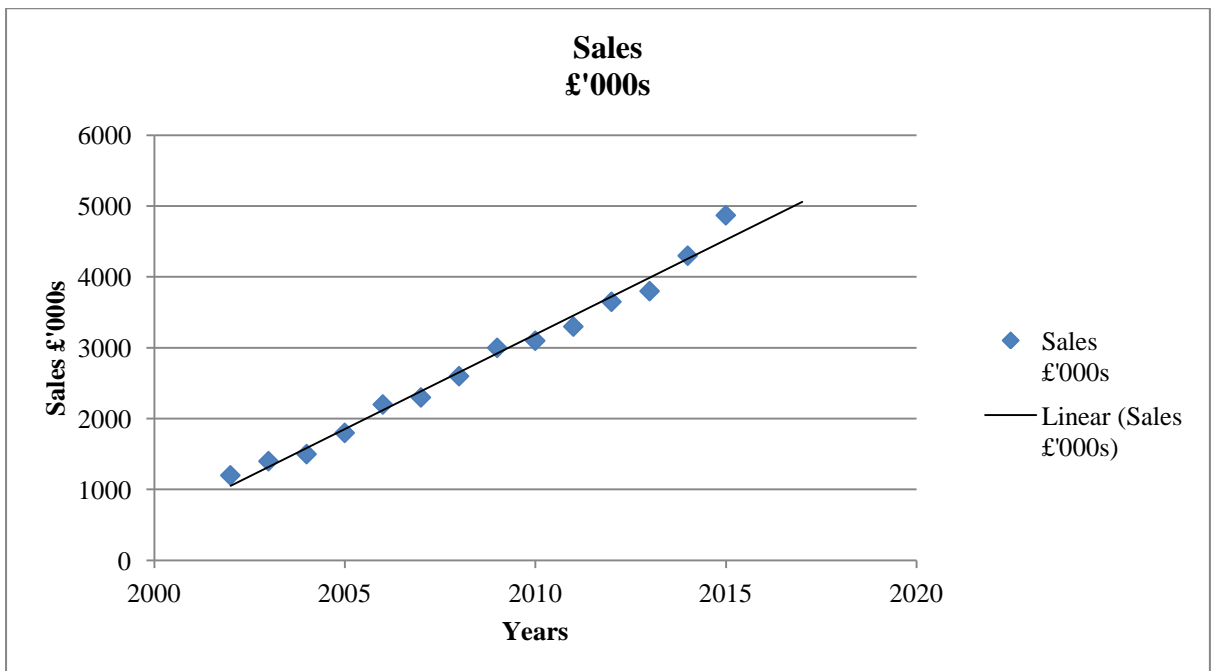


Figure 12 Trend Line for Sales Cost Scatter Graph

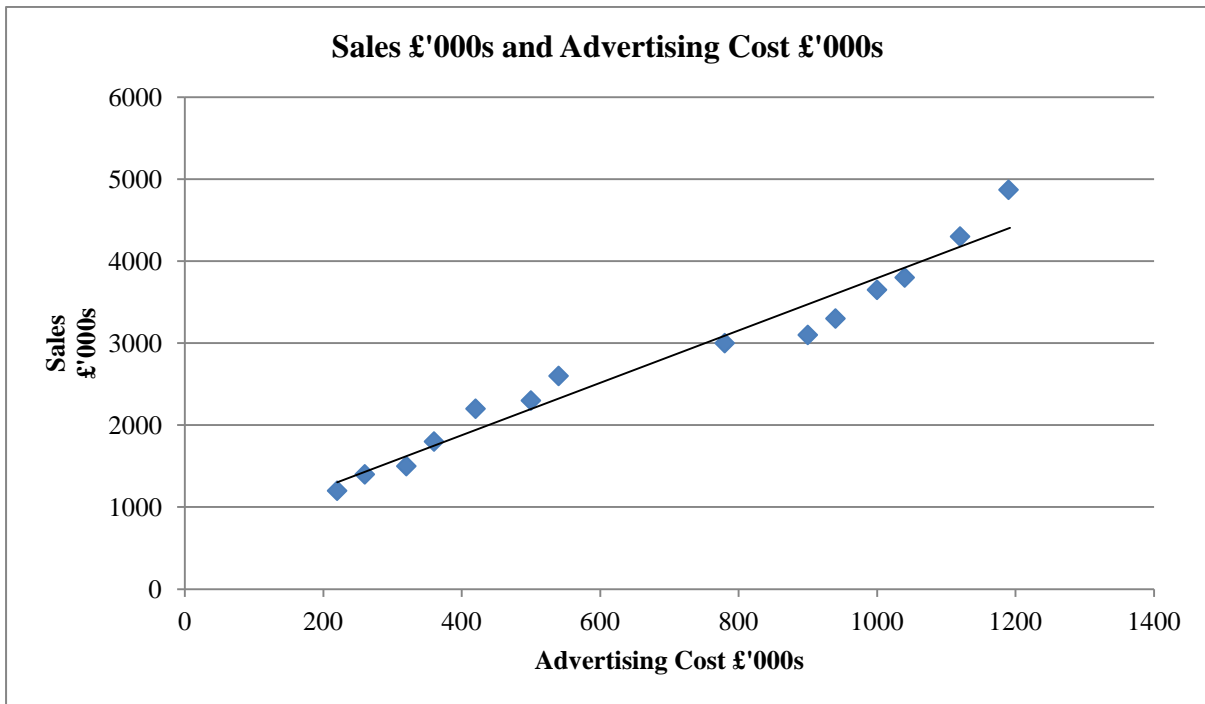


Figure 13 Trend Line for Scatter Graph Line Graph between Sales and Advertising

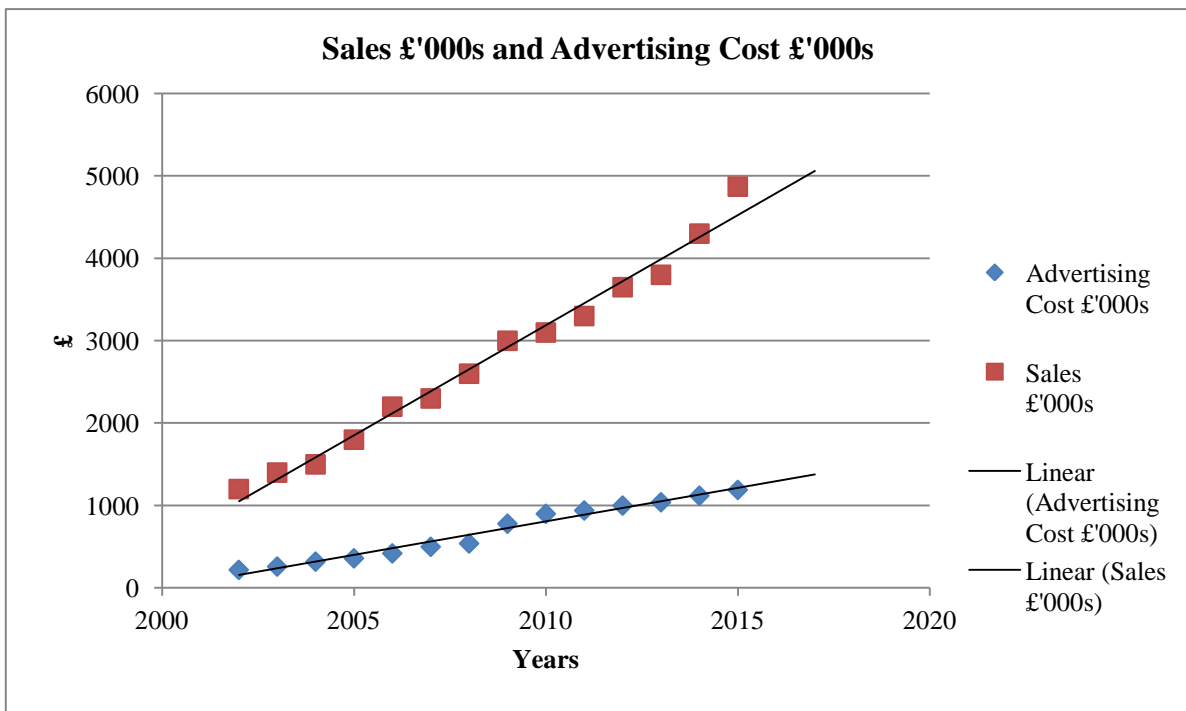


Figure 14 Comparing Figures of Sales and Advertising (Trend Line Scatter Graph)

The linear equation for line fitted on the scatter graph is $y = 3.07x - 600$

TASK 4 (A)**Network Diagram**

The following network diagrams have been constructed for the provided data.

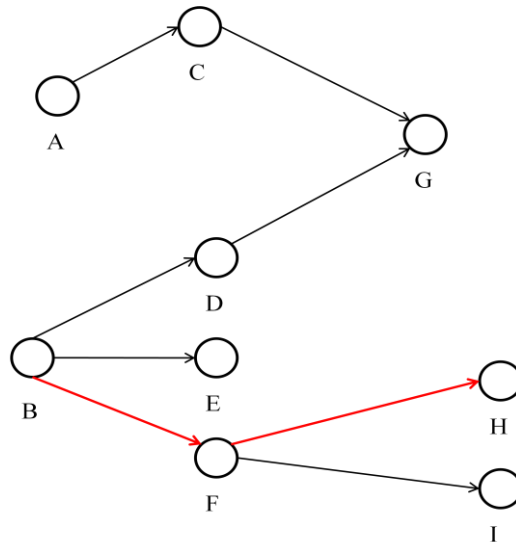


Figure 15 Network Diagram 1

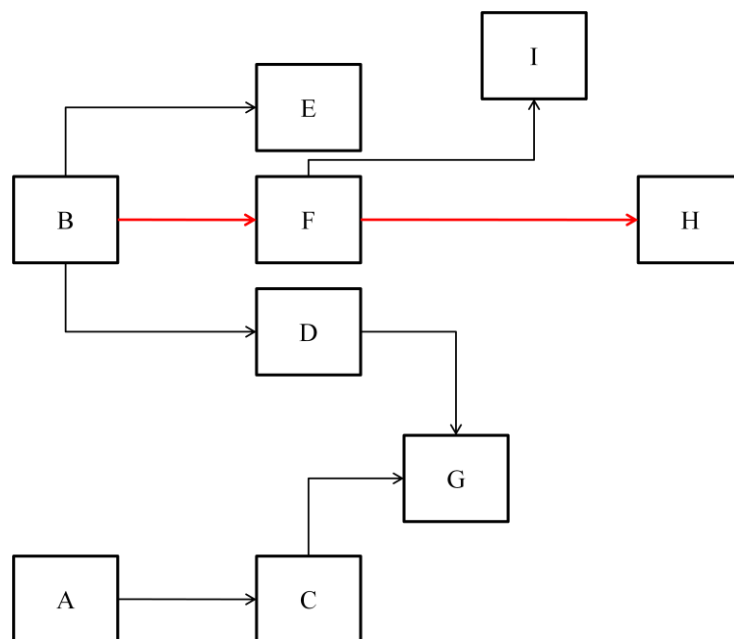


Figure 16 Network Diagram 2

Critical Path Duration

The critical path duration for this project has been defined in red in the network diagrams. The pathway of B to F to H is the critical path duration for the defined scenario,

highlighting which activities are to be processed on time; otherwise the whole course would not be completed. Based on the defined path, it shows such activities.

Gantt Chart

Following is the Gantt chart for the mentioned scenario.

Activities to be conducted	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Activity A: Replace windows in lounges	■	■	■	■	■							
Activity B: Rewiring	■	■	■	■								
Activity C: Re-plaster walls of lounges						■	■					
Activity D: Fit lights in lounges					■							
Activity E: Decorate bedrooms					■	■	■	■				
Activity F: Install plumbing					■	■	■	■				
Activity G: Decorate lounges								■	■	■	■	
Activity H: Decorate Kitchens										■	■	■
Activity I: Decorate										■	■	

Figure 17 Gantt Chart

Benefits of using a Gantt Chart

Gantt chart is advantageous when utilised as a project management tool because it helps in depicting a graphical representation of a particular schedule for a project, which becomes an easy way to plan, coordinate amongst team members of that project and track any particular task within the process.

TASK 4 (B)**NPV**

By using the financial tools for decision-making, NPV and IRR have been calculated

Table 1 Calculations for Project A

	Project A				
	Year	Cash Flow	Discount Factors	Present Value	
Investment	0	-250,000	1	-250,000	
	1	100,000	0.909	90,900	
	2	115,000	0.826	94,900	
	3	125,000	0.751	98,875	
	4	130,000	0.683	88,790	
	5	140,000	0.621	86,940	
					NPV = 205, 495 (A)

Table 2 Calculations for Project B

Project B					
Year	Cash Flow	Discount Factors	Present Value		
0	-250,000	1	250,000		
1	90,000	0.909	81,810		
2	125,000	0.826	103,250		
3	135,000	0.751	101,385		
4	110,000	0.683	75,130		
5	85,000	0.621	52,785		
					NPV = 164 360 (A)

$$IRR = X + a / a-b (Y-X)$$

X = Lower Interest Rate

Y = Higher Interest Rate

A = Net Present Value of a lower rate

B = Net Present value of a higher rate

Putting values from the previous example

Table 3 Calculations for Project A

	Project A			
	Year	Cash Flow	Discount Factors	Present Value
Investment	0	-250,000	1	-250,000
	1	100,000	0.833	83,300
	2	115,000	0.694	79,810
	3	125,000	0.579	72,375
	4	130,000	0.482	62,660
	5	140,000	0.402	56,280

Table 4 Calculations for Project B

	Project B			
	Year	Cash Flow	Discount Factors	
Investment	0	-250,000	1	
	1	90,000	0.833	
	2	125,000	0.694	
	3	135,000	0.579	
	4	110,000	0.842	
	5	85,000	0.402	
				NPV = 164 360 (A)

From the two projects of A and B, the project that would be selected would be Project A. This is because the NPV and IRR value obtained for this project is higher indicating more profit compared to project B.

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