

# Individual Coursework

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**REQUIREMENT 5****1. INCOME STATEMENT AND BREAK-EVEN ANALYSIS****a) Summary of results**

The operating profit is positive every year except FY5. This is because, in FY5 the contribution is lower than total fixed costs. *Figure 2* and the break-even charts in *figures 5-9* show over 70% operating gearing for every year (high fixed costs compared to variable costs), meaning that when sales are booming/decreasing, profits will rise/fall to a greater extent. In FY2, the sales increase of 21% resulted in a profit increase of 131%, while in FY5 the sales decrease of 34% caused a profit decrease of 135%. This indicates that FinFun could be a great investment opportunity as long as it is possible to increase the demand and how much customers are willing to pay.

Contribution as a percentage of sales is constantly above 75%, meaning that the business managed to keep the variable costs low compared to the sale price.

*Figure 3* and the break-even charts reveal the following:

- The project needs fewer customers to break-even in FY2 (748) compared to FY1 (829). This occurred due to the 10% increase in pay rate.
- The break-even point in FY2, FY3, and FY4 was very similar as contribution did not change and there was only a 1% increase in fixed costs every year
- The project needs substantially more customers to break-even in FY5 (1172) compared to FY4 (770). This occurred due to the 27% decrease in customer pay rate and thus a 33% decrease in contribution per customer. FY5 is the only year when BEP is not achieved as BEP as a percentage of sales is higher than 100%. Increasing the pay rate to 91 would give a positive operating profit by decreasing BEP to 991 units. (*Figure 4*).

**b) Limitations**

The project profit figures may not be accurate as there are different ways for calculating overhead charges. Moreover, different ways for calculating depreciation yield different results – for example reducing balance method would give a charge of £7200 for FY1.

**2. INCREMENTAL CASH-FLOW AND PAY-BACK PERIOD****a) Summary of results**

Only FY0 has negative cash consequences due to the investments made. The increase in profits in FY2 and decrease in profits in FY5 is reflected in the cash consequences. The cash investment of the project is returned in 5,12 years, which occurs right after the selling of Vrents Ltd. The long payback period indicates a downside of pursuing FinFun, but only because the sale occurs so early in the life of the project.

## **b) Limitations**

One limitation of the payback period is that it does not consider the cash possibly generated later in the life of the project. Lyn and Al could also consider pursuing the project for a longer time. Another disadvantage is disregarding investors' expectations of return.

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## **3. NPV AND IRR**

### **a) Summary of results**

The NPV at a 12% cost of capital exceeds the expectations of investors by £10,001 which indicates a good reason to pursue the project. However, the IRR is only 13.24%, which means the margin of safety is very low (1.24%). The project is vulnerable to changes in the expectations of the investors. Therefore, FinFun is an attractive, but risky project to pursue.

### **b) Limitations**

IRR does not consider the size of the project – smaller projects might have larger IRR. Moreover, IRR assumes cash flows can be reinvested at the same rate of the IRR which is not the case as there can be fluctuations of negative and positive cash flows across the life of the project.

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## **4. OTHER FACTORS**

- Changes in the expectations of investors

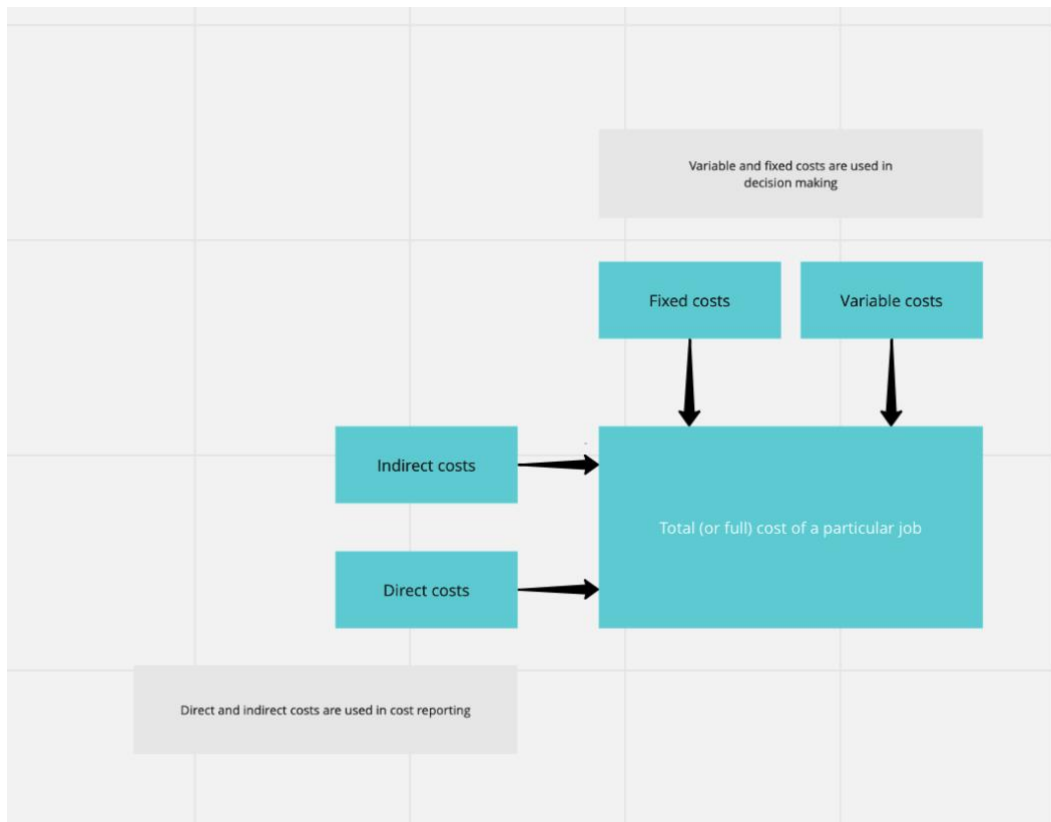
As the operating gearing is over 70%, a good strategy might be to increase advertising costs which would bring more customers. The calculations in *figures 14-16* indicate that doubling advertising costs in FY5, increasing pay rate to 110 as in FY4, and doubling the number of customers would bring a percentage increase in operating profit of 1348%. These changes would result in a cash flow of £175,300 in FY5 and an IRR of 20.2%. The margin of safety of 8.2% would make FinFun less vulnerable to changes in the expectations of investors.

- Changes in the prices of suppliers

Calculations are projected in the future, so the costs are subject to change – for instance, it is possible that the computer consumable cost per customer increases if there is a shortage of materials and suppliers increase the price. This would lower the operating gearing and thus would make the project far less attractive.

## PART 2

Costs can be classified into two big categories according to their usage: cost reporting and financial decision making, as indicated in *figure A*.



*Figure A*

In cost reporting, organisations perform full cost analysis to establish the full cost per unit of a product. This analysis is used by managers to assess the efficiency of the company's spending habits or for assessing performance.

The costs used in costs reporting are split into direct and indirect costs. Direct costs are defined as the costs clearly associated with outputs and easy to measure. These could be direct labour costs (wages) and direct materials costs. As the name suggests, indirect costs are difficult to associate with outputs. They are sometimes referred to as overheads and are not easily financially measured. The full cost per unit of a product is just the sum of the direct and indirect costs per unit.

There are two possible methods for charging overheads: traditional and activity-based costing, as shown below.

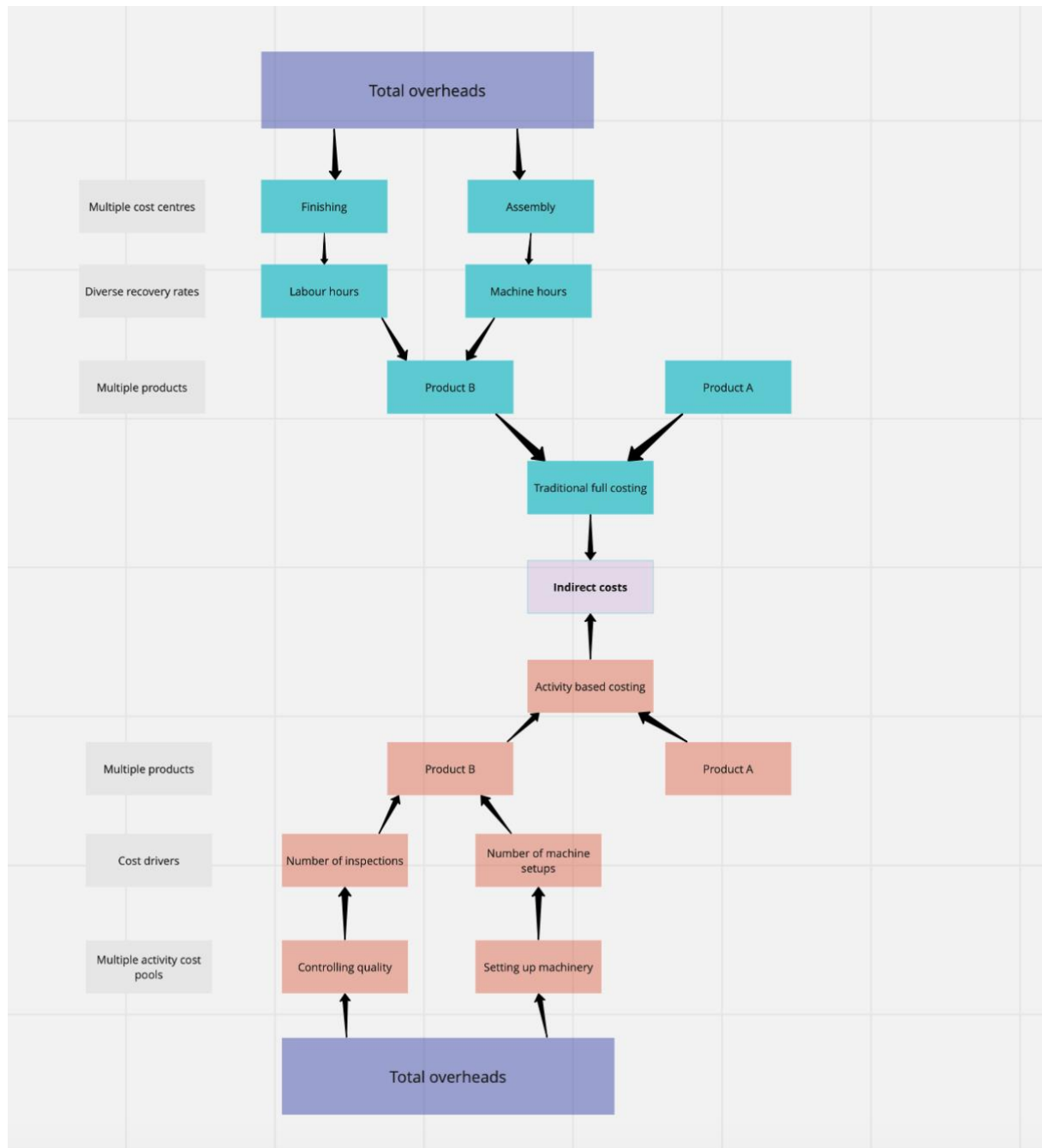


Figure B

In traditional full costing, the indirect cost per unit is charged by dividing the planned fixed overheads by the planned number of units of the basis of charging. The basis of charging could be unit of output rate, labour hour rate, machine hour rate, direct materials unit rate (each metre) etc. as established by organisations to suit their purposes. For example, in *figure C* the company was producing product A (standard tables) and product B (luxury tables). As the products are different, it would not be appropriate to use unit of output rate as a basis of charging. The company established labour hours as a basis as product A takes 4 hours to produce while product B takes 6 hours to produce. The cost per unit per labour hour is calculated by dividing total overheads by total hours for both products. Then, for each product, the overhead charge per unit is the rate multiplied by the number of hours per unit.

Full cost using traditional costing			overheads/total hours
Overhead recovery rate labour hours			£4,55
Based on direct labour hours			
Planned overheads			£1.000.000,00
Planned total labour hours			220000
	Units	Hours/unit	Hours
A	40000	4	160000
B	10000	6	60000
For each unit			A B
Overhead charge (recovery rate x hours/unit)			£18,18 £27,27

Figure C

The next step is calculating the total cost per unit (shown in *Figure D*).

For each unit	A	B
Direct labour (£10/hour)	£40,00	£60,00
Direct materials	£15,00	£20,00
Overhead charge	£18,18	£27,27
Full cost	£73,18	£ 107,27

Figure D

However, let us say the company decides to use machine hours as a basis of charging as seen in *figure E*. Product A uses 2 machine hours while product B uses 13 machine hours. The overhead charge per unit would give different results for both product A and product B. This indicates that overhead charges are never fully accurate as they are charged based on the decision-making or policy of a particular company.

Full cost using traditional costing			overheads/total hours
Overhead recovery rate machine hours			£4,76
Based on machine hours			
Planned overheads			£1.000.000,00
Planned total machine hours			210000
	Units	Hours/unit	Hours
A	40000	2	80000
B	10000	13	130000
For each unit			A B
Overhead charge (recovery rate x hours/unit)			£9,52 £61,90

Figure E

While it is possible to calculate one overhead rate for all the activities across the business, organisations could also apportion the costs for each cost centre. *Figure F* shows how rent costs were apportioned between the 3 costs centres based on the floor area. Moreover, it is possible that cost centres use a different base for charging. In the example below, cutting and assembly use machine hour rate as the managers regarded them as machine intensive, while finishing was regarded as labour intensive.

	<u>Cutting</u>	<u>Assembly</u>	<u>Finishing</u>	<u>Totals</u>
Floor Area m <sup>2</sup>	770	1.310	1.080	<b>3.160</b>
<b>Rent unallocated</b>				<b>184.000</b>
Rent allocated	184.000 x 770/3.160	184.000 x 1.310/3.160	184.000 x 1.080/3.160	
	44835,44	76278,48	62886,08	
<b>Allocated Costs</b>				
Indirect Labour	72.400	83.900	108.600	<b>264.900</b>
Indirect materials	1.850	780	12.640	<b>15.270</b>
Machine costs	64.000	56.400	48.900	<b>169.300</b>
<b>Total</b>	<b>£183.085,44</b>	<b>£217.358,48</b>	<b>£233.026,08</b>	
Machine hours	180.000	85.000		
Labour hours			240000	
Machine absorbtion rate	£1,02	£2,56		
Labour absorbtion rate			£0,97	

*Figure F*

Many businesses prefer to use activity-based costing (ABC) for charging overheads instead of the traditional method. One reason for this is the fact that markets are more complicated nowadays and some consider that it is more appropriate to link overheads to the activities that cause them. These activities could be quality control, setting up machinery, operating machinery etc. In *Figure G*, the overheads of the two products would be apportioned according to the 4 activities involved.

Activity and cost driver	Cost £000s	Annual number of activities		
		Total	Product A	Product B
Number of machine set-ups	280	100	20	80
Number of quality inspections	220	2.000	500	1.500
Number of sales orders	240	5.000	1.500	3.500
Production logistics - machine hours	<u>260</u>	500.000	350.000	150.000
<b>Total</b>	<b><u>1000</u></b>			

*Figure G*



There are disadvantages in using ABC. Some costs may apply to more than one cost pool which makes the apportionment base decision subjective. Moreover, as ABC is more complex than traditional costing, it might not be suitable for simple and stable markets.

It can be concluded that cost reporting is a daunting process even for financial specialists, as charging indirect costs is a matter of subjective judgement which can be done using diverse methods.

The other usage of costing is decision-making. For this purpose, costs are categorised as fixed and variable as presented in *Figure A*. Variable costs change with activity levels while fixed costs are unchanged within a particular range of activity.

On the left, fixed overheads are equally apportioned between the 4 products for cost reporting. This representation indicates that products 3 and 4 make a loss and should be given up. On the right side, the decision-making representation of costs is constructed by deducting variable costs from sales to find the contribution of each product. Total fixed costs are deducted from the total contribution to calculate the profit. The insights revealed are that products 3 and 4 make a contribution of £9 to the total profit and giving them up would result in a loss of £6. This example illustrates why variable and fixed costs are better for decision-making.

Product	1	2	3	4	Total
<i>All £m</i>					
Sales	30	20	10	5	65
Less: Variable costs	8	8	4	2	22
Less: Fixed costs apportioned	10	10	10	10	43
Profit (loss)	12	2	(4)	(7)	3

*Figure H*

Product	1	2	3	4	Total
<i>All £m</i>					
Sales	30	20	10	5	65
Less: Variable costs	8	8	4	2	22
= Contribution	22	12	6	3	43
Less: Fixed costs in total					40
Profit (loss)					3

*Figure I*

Another usage of variable/fixed costs is break-even analysis. An example of this is illustrated in section 1. a). Dividing fixed costs by contribution per unit of product results in the break-even point, helping managers visualise the number of outputs to be achieved in order to break-even. This is helpful in deciding whether to pursue projects based on a margin of safety – how many units are sold above the break-even point.

Having defined the basic usages of fixed/variable costs, it is time to describe the challenges associated with them. Cost-volume-profit analysis represents the decisions made on ways to alter selling price/variable and fixed costs/volume of units sold in order to increase profit in a given scenario. This could be challenging as there are multiple methods to consider. For example, given two products, A,B, a scarce resource (labour at a maximum budget), and the projected sales revenue for each product, how could one maximise profits? The first obvious step is to calculate the contribution of each product and rank them. Thereafter, one would probably produce as much as possible from the first ranked product. If the target sales are achieved, one would go to the second-ranked product and produce it until the labour funds are exhausted. This approach was probably the most obvious one. However, maximising profit involves thinking outside the box – another approach might be to try to sell more than the targeted sales for the first ranked product by reducing the price while keeping the contribution higher than the second product. One could also analyse the external factors such as competition to examine if there is an opportunity to increase the price of the second-ranked product to make its contribution higher than the first one's and then sell as many units of this product first.

Costs are also used in decision-making when managers want to decide whether to pursue a project. In this situation, an incremental cash flow would be constructed to display the cash consequences of the project. Apart from additional cash inflows/outflows, opportunity costs should be included in the incremental cash flow as a minus. Identifying opportunity costs from other projects is extremely difficult to measure and can never be 100% accurate. This means that, again, these costs are subject to interpretation, which makes them difficult to be understood by non-financial specialists.

At the end of the day, costs are difficult to digest. Cost reporting is exhausting only due to the endless methods and combinations of methods in which it can be done, each yielding different results. Financial decision-making is a matter of creative judgment – one needs to consider external factors to arrive at fair decisions.

## APPENDIX

### REQUIREMENT 1

REQUIREMENT 1	INCOME STATEMENT					
year		1	2	3	4	5
target nr customers		1000	1100	1100	1100	1000
customer pay rate		100	110	110	110	80
<b>sales revenue</b>		100000	121000	121000	121000	80000
variable costs (specialist software, 10 for each customer)		10000	11000	11000	11000	10000
variable costs (computer consumable, 10 per costumer)		10000	11000	11000	11000	10000
<b>total variable costs</b>		20000	22000	22000	22000	20000
<b>gross profit (contribution)</b>		80000	99000	99000	99000	60000
fixed costs (patent)		10000	10000	10000	10000	10000
fixed costs (equipment)		3600	3600	3600	3600	3600
fixed costs (specialist software)		10000	10000	10000	10000	10000
fixed costs (salaries)		20000	21000	22000	23000	24000
fixed costs (rent)		10000	10000	10000	10000	10000
fixed costs (legal and insurance)		1500	1500	1500	1500	1500
fixed costs (advertising costs)		1200	1200	1200	1200	1200
fixed costs (head office)		10000	10000	10000	10000	10000
<b>total fixed costs</b>		66300	67300	68300	69300	70300
<b>operating profit</b>		13700	31700	30700	29700	-10300

Figure 1

#### Procedures:

Year	1	2	3	4	5
Sales revenue	$1,000 * 100 = 100,000$	$1,100 * 110 = 121,000$	$1,100 * 110 = 121,000$	$1,100 * 110 = 121,000$	$1,000 * 80 = 80,000$
Total variable costs	$10 * 1,000 + 10 * 1,000 = 20,000$	$10 * 1,100 + 10 * 1,100 = 22,000$	$10 * 1,100 + 10 * 1,100 = 22,000$	$10 * 1,100 + 10 * 1,100 = 22,000$	$10 * 1,000 + 10 * 1,000 = 20,000$
Contribution	$100,000 - 20,000 = 80,000$	$121,000 - 22,000 = 99,000$	$121,000 - 22,000 = 99,000$	$121,000 - 22,000 = 99,000$	$80,000 - 20,000 = 60,000$
Total fixed costs	Calculated by summing up all the fixed costs				
Operating profit	$80,000 - 66,300 = 13,700$	$99,000 - 67,300 = 31,700$	$99,000 - 68,300 = 30,700$	$99,000 - 69,300 = 29,700$	$60,000 - 70,300 = -10,300$

## Additional

Year	1	2	3	4	5
Contribution as a percentage of sales	80%	82%	82%	82%	75%
operating gearing (TFC/TC)	77%	75%	76%	76%	78%
sales increase		21%	0	0	-34%
profit decrease/increase		131%	-3%	-3%	-135%

Figure 2

## REQUIREMENT 2

REQUIREMENT 2	year	1	2	3	4	5
hourly pay rate		100	110	110	110	80
variable costs (specialist software, 10 for each customer)		10	10	10	10	10
variable costs (computer consumable, 10 per costumer)		10	10	10	10	10
<b>total variable costs</b>		20	20	20	20	20
<b>CONTRIBUTION PER UNIT</b>		80	90	90	90	60
<b>total fixed costs</b>		66300	67300	68300	69300	70300
<b>FC/CONTRIBUTION UNIT</b>		828,8	747,8	758,9	770	1171,7
<b>BEP</b>		<b>829</b>	<b>748</b>	<b>759</b>	<b>770</b>	<b>1172</b>
BEP in £		82900	82280	83490	84700	93760
MOS		171	352	341	330	-172
BEP in %		83%	68%	69%	70%	117%
MOS in %		17%	32%	31%	30%	-17%

Figure 3

## Procedures:

Year	1	2	3	4	5
Contribution per unit	$100 - (10+10) = 80$	$110 - (10+10) = 90$	$110 - (10+10) = 90$	$110 - (10+10) = 90$	$80 - (10+10) = 60$
Fixed costs/contribution per unit	$66,300/80 = 828.8$	$67,300/90 = 747.8$	$68,300/90 = 758.9$	$69,300/90 = 770$	$70,300/60 = 1171.7$

## Additional

Proposal: Increase pay rate to 91 in FY5 to achieve the BEP and have a positive profit.

5
91
10
10
20
71
70300
990,1
991
90181
9
99%
1%

Figure 4

## Break-even charts

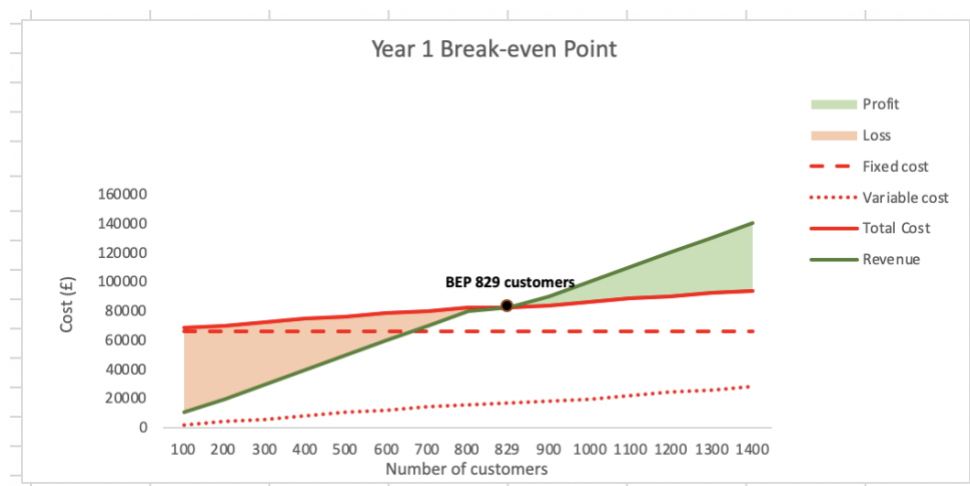


Figure 5

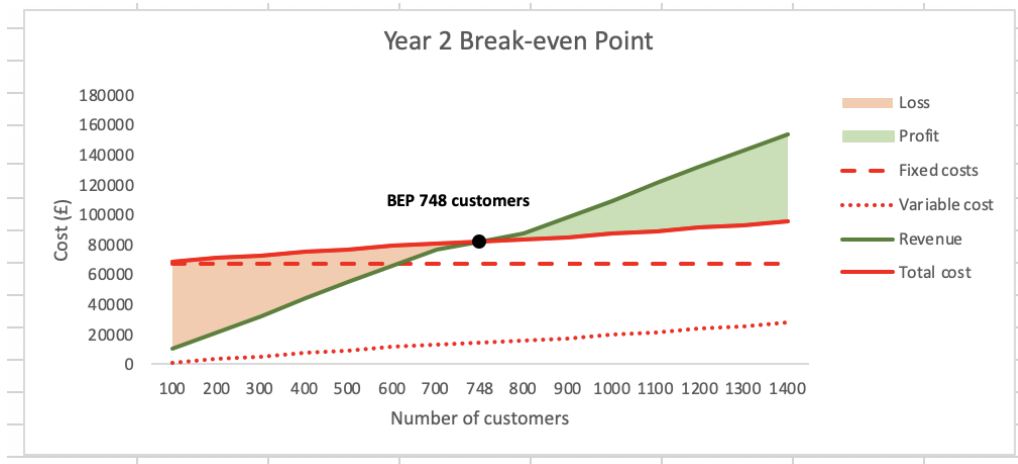


Figure 6

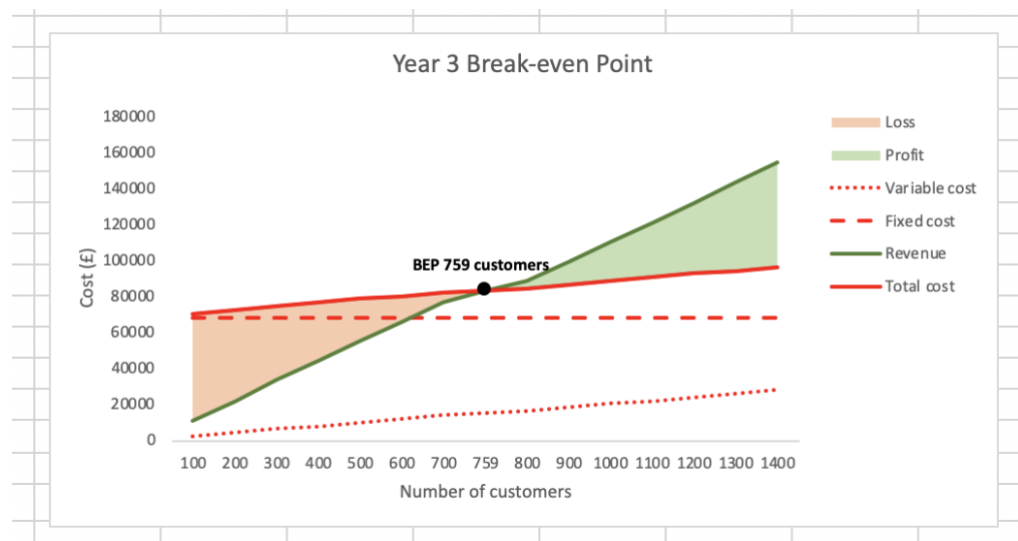


Figure 7

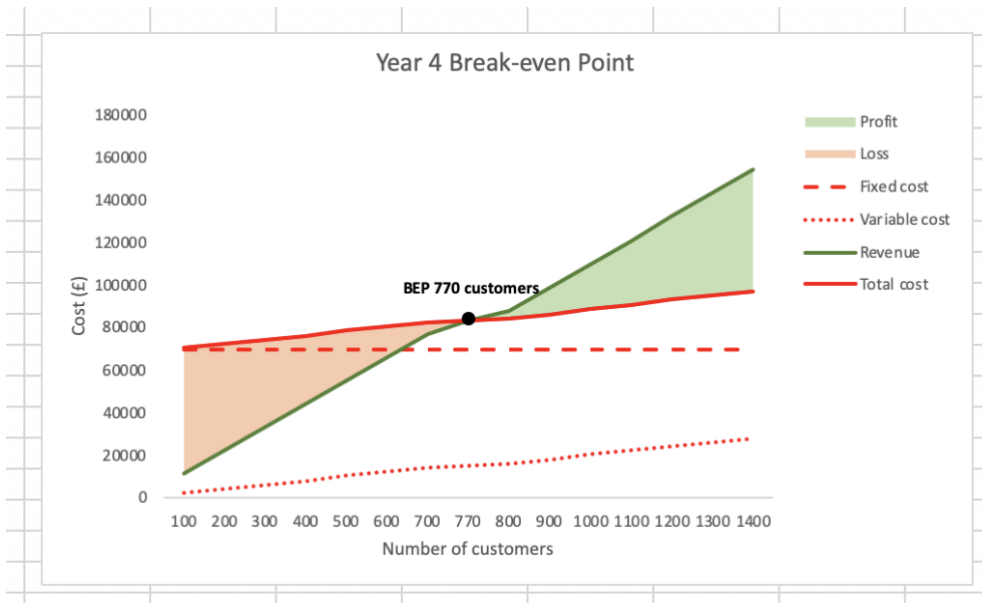


Figure 8

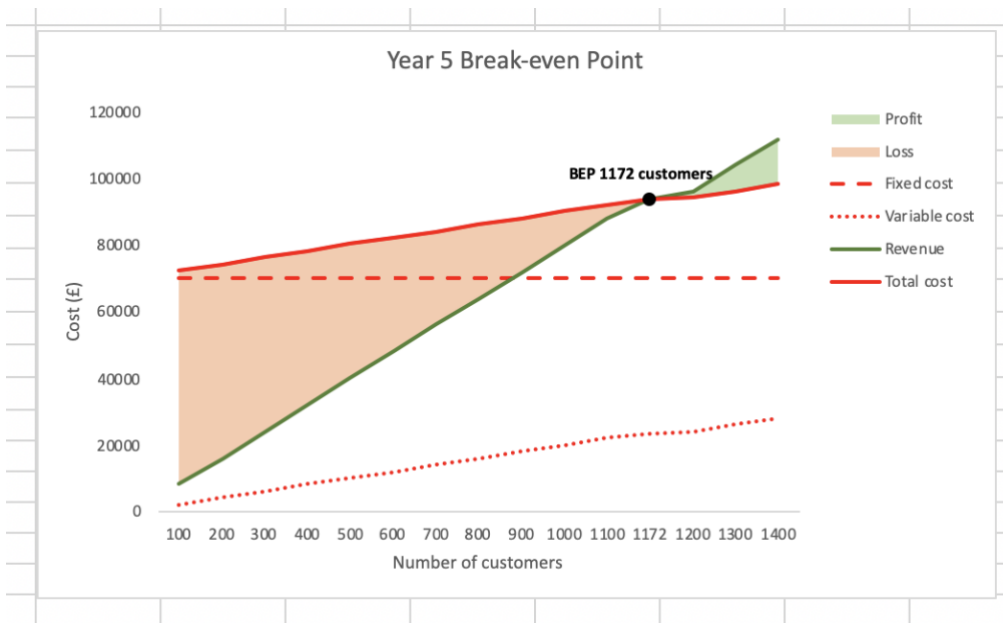


Figure 9

## REQUIREMENT 3

REQUIREMENT 3							
year	0	1	2	3	4	5	6
sales revenue		100000	121000	121000	121000	80000	
sale of vrents							200000
<b>cash inflow</b>	<b>0</b>	<b>100000</b>	<b>121000</b>	<b>121000</b>	<b>121000</b>	<b>80000</b>	<b>200000</b>
purchase of vrents	154.352						
payment to it director	70.000						
purchase of new equipment	18000						
variable costs (specialist software, 10 for each customer)		10000	11000	11000	11000	10000	
variable costs (computer consumable, 10 per costumer)		10000	11000	11000	11000	10000	
fixed costs (patent)	10.000	10.000	10.000	10.000	10.000		
fixed costs (specialist software)		10.000	10.000	10.000	10.000	10.000	
fixed costs (salaries)		10.000	10.500	11.000	11.500	12.000	
fixed costs (rent)	20.000		10.000	10.000	10.000		
legal and insurance		1.500	1.500	1.500	1.500	1.500	
advertising cost		1.200	1.200	1.200	1.200	1.200	
<b>cash outflow</b>	<b>272.352</b>	<b>52.700</b>	<b>65.200</b>	<b>65.700</b>	<b>66.200</b>	<b>44.700</b>	<b>-</b>
<b>INCREMENTAL CASH FLOW</b>	<b>- 272.352</b>	<b>47.300</b>	<b>55.800</b>	<b>55.300</b>	<b>54.800</b>	<b>35.300</b>	<b>200.000</b>
<b>CUMULATIVE</b>	<b>- 272.352</b>	<b>- 225.052</b>	<b>- 169.252</b>	<b>- 113.952</b>	<b>- 59.152</b>	<b>- 23.852</b>	<b>176.148</b>

Figure 10

### Procedures:

Year	0	1	2	3	4	5	6
Cash inflow	0	100,000	121,000	121,000	121,000	80,000	200,000
Cash outflow	Calculated by summing up all the cash outflows						
Incremental cash flow	0 – 272,352 = -272,352	100,000 – 53,700 = 47,300	121,000 – 65,200 = 55,800	121,000 – 65,700 = 55,300	121,000 – 66,200 = 54,800	80,000 – 44,700 = 35,300	200,000 – 0 = 200,000
Cumulative	-272,352	-272,352 + 47,300 = -225,052	-225,052 + 55,800 = -169,252	-169,252 + 55,300 = -113,952	-113,952 + 54,800 = -59,152	-59,152 + 35,300 = -23,852	-23,852 + 200,000 = 176,148



## REQUIREMENT 4

### a. Payback Period

<b>Non-discounted payback period</b>	
PAYBACK 5 years + 23852/200000	
	0,11926 <b>5,12 years</b>

Figure 11

### b. NPV

NPV	12% multiply ICFs	1	0,893	0,797	0,712	0,636	0,567	0,507
Present Values		- 272.352	42.239	44.473	39.374	34.853	20.015	101.400
NPV		10.001						

Figure 12

### Procedures

NPV	$-272,352 * 1 + 47,300 * 0.893 + 55,800 * 0.797 + 55,300 * 0.712 + 54,800 * 0.636 + 35,300 * 0.567 + 200,00 * 0.507 = 10,001$
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### c. IRR

NPV	20% multiply ICFs	1	0,833	0,694	0,579	0,482	0,402	0,335
Present Values		- 272.352	39.401	38.725	32.019	26.414	14.191	67.000
NPV		- 54.603						

<b>IRR</b>	positive	negative	spread
	NPV DF	NPV DF	between the DFs used
	12 10001	20 -54603	8 64604

Accordingly...	$\frac{10001}{64604}$	=	0,155	then multiply this by the spread between the two discount factors you used.	in this case, 8,00
		=	1,24	which is the distance between the two DFs	
		=	so...		
		=	12 + 1,24		
IRR		=	13,24 %		

Figure 13

## Other factors to consider

Proposal: in FY5, double advertising costs and number of customers and increase the pay rate to 110. This would result in an increase in operating profit of 1348% and cash flow of £175.300 and IRR of 20.2%.

	Y5	Proposal
target nr customers	1000	2000
customer pay rate	80	110
<b>sales revenue</b>	<b>80000</b>	<b>220000</b>
variable costs (specialist software, 10 for each customer)	10000	10000
variable costs (computer consumable, 10 per costumer)	10000	10000
<b>total variable costs</b>	<b>20000</b>	<b>20000</b>
<b>gross profit (contribution)</b>	<b>60000</b>	<b>200000</b>
fixed costs (patent)	10000	10000
fixed costs (equipment)	3600	3600
fixed costs (specialist software)	10000	10000
fixed costs (salaries)	24000	24000
fixed costs (rent)	10000	10000
fixed costs (legal and insurance)	1500	1500
fixed costs (advertising costs)	1200	2400
fixed costs (head office)	10000	10000
<b>total fixed costs</b>	<b>70300</b>	<b>71500</b>
<b>operating profit</b>	<b>-10300</b>	<b>128500</b>
<b>percentage increase in profit:</b>	<b>1348%</b>	

Figure 14

5
220000
220000
10000
10000
10.000
12.000
1.500
2.400
44.700
175.300
116.148

Figure 15

<b>IRR</b>	<b>20,2%</b>
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Figure 16