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FINANCIAL MANAGEMENT

ASSESSMENT

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PART A

This report will focus on the case of the financial analysis of Vodafone Group Plc, a major British telecommunication company with interests around the world. The company's name comes from the words **Voice-data-fone**. The company is based in Newbury, Berkshire (UK) with multiple offices in the countries which operates. In 1950 started as part of a military radar and electronics business called Racal. It wasn't until 1983 that Racal founded its Vodafone subsidiary and obtained the permit to develop Britain's first mobile phone network. The founders were Ernest Harrison and Gerald Whent, with the latter being the first CEO until 1996 (Vodafone, 2012). By the beginning of 90's Vodafone was investing towards acquiring other companies and creating worldwide partnerships. In 2000, the company achieved one of the largest mergers ever made, which resulted in doubling its size, with Mannesmann AG (Britannica, 2020). To date, Vodafone is a global leader in the field, possesses and manages networks in more than 21 countries, and created network partnerships in 48 additional ones (Vodafone, 2020b). Also, offers IT and telecommunication services to corporate customers in 150 countries. In 1988, Vodafone went public on the Stock Exchange of London and is part of the FTSE100 Index, with a secondary listing in Nasdaq. The list of executive management from 1988 until today is:

Chief Executive	Tenure
Sir Gerald Whent	October 1988 – December 1996
Sir Christopher Gent	January 1997 – July 2003
Arun Sarin	July 2003 – July 2008
Vittorio Colao	July 2008 – September 2018
Nick Read	Since October 2018

The current business strategy of Vodafone is to (Vodafone, 2021):

- Expand in more regions and especially in emerging markets (Africa & India).
- Gain and retain new and existing clients.
- Support innovation and promote technology (5G).
- Meet the sustainability and specific societal needs.
- Attract increasing revenues for shareholders.

The company, apart from having the largest share in cellular networks, also provides a wide array of products and services such as voice, messaging, roaming, broadband, cloud storage and mobile money transfer services. In addition, has expanded in the manufacture of mobile phones (Vodafone 150) and data connect cards. Finally,

Vodafone has been involved in providing health services and has a large portfolio of charity projects (Dolan, 2009).

The major competitors of Vodafone are BT, Liberty Global, Deutsche Telekom, Telstra, Telefonica, AT&T, Orange, Tata Communications and NTT (Craft, 2020).

In Vodafone's lifetime, the company has faced several significant events; both opportunities and risks, that shaped the business strategy and influenced the financial condition (Dolan, 2009; Bloomberg, 2012; Browning et al., 2012; BBC, 2016; CNBC, 2017; Business Wire, 2019; The Telegraph, 2020).

- 2007 – 2013: Sponsorship deal with McLaren Formula One Team.
- 2010: Private Eye magazine investigation on tax evasion actions, from the Mannesmann merge.
- 2011: Acquisition of Bluefish communications Ltd., focusing in corporate and cloud services.
- 2012: Acquisition of Cable & Wireless Worldwide (CWW) for £1.04 billion, to expand fibre network.
- 2016: Record Fined by Ofcom (£4.6m) for client protection rules violation.
- 2017: Legal measures to prevent their marketing in appearing in hate speech and fake news webpages.
- 2019: Collaboration with Inseego Corp (Qatar) to introduce the first commercially available 5G hotspot.
- 2020: Vodafone won the case of India's effort to claim past taxes in an international arbitration tribunal.
- 2020: Withdrawal from the Libra Association on Facebook's cryptocurrency initiative.

PART B

Income Statement	Vodafone [€m]					BT [€m]
	2016	2017	2018	2019	2020	2020
Revenue	49810	47631	46571	43666	44974	22905
Cost of Sales	36713	34576	32771	30160	30682	
Gross profit	13097	13055	13800	13506	14292	13258
Selling and distribution expenses	-4603	-4349	-4011	-3891	-3814	
Administrative expenses	-6379	-6080	-5116	-5410	-5810	
Net credit losses on financial assets	-	-	-528	-575	-660	
Share of results of equity accounted associates & joint ventures	60	47	-59	-908	-2505	
Impairment loss	-569	-	-	-3525	-1685	
Other income/ (expense)	-286	1052	213	-148	4281	
Operating profit	1320	3725	4299	-951	4099	3697
Non-operating expense	-3	-1	-32	-7	-3	
Investment income	539	474	685	433	248	
Financing costs	-2046	-406	-1074	-2088	-3549	
Profit (Pre-tax)	-190	2792	3878	-2613	795	
Tax	4937	4764	-879	1496	1250	
Net Profit (profit after tax) for continued operations	-5127	-1972	4757	-4109	-455	1734
Net Profit (profit after tax) for discontinued operations	5	-4107	-1969	-3535	-	
Net Profit (overall)	-5122	-6079	2788	-7644	-455	
Atributable to:						
Owners of the parent	-5405	-6297	2439	-8020	-920	
Non-controlling interests (Minority)	283	218	349	376	465	
EBITDA	12736	15587	15478	9084	17775	
Earnings before interest & taxation (EBIT)	1039	4501	5069	-711	3601	

Balance Sheet	Vodafone [€m]					BT [€m]
	2016	2017	2018	2019	2020	2020
Fiscal Year Ends	31/3/2016	31/3/2017	31/3/2018	31/3/2019	31/3/2020	
Assets						
Non Current Assets						
Intangible	58564	46220	43257	41005	53523	
Tangible (PP&E)	35515	30204	28325	27432	39197	18474
Investments	5110	6597	5742	4822	6623	
Other	34624	28926	30336	30017	34574	
Total non-current assets	133813	111947	107660	103276	133917	41075
Current Assets						
Inventory	716	576	581	714	585	300
Taxation recoverable	1402	150	106	264	275	
Trade and other receivables	11561	9861	9975	12190	11411	
Other investments	5337	6120	8795	13012	7089	
Cash & other equivalents	12922	8835	2674	13637	13284	1549
Assets held for sale	3356	17195	13820	-231	1607	
Total current assets	35294	42737	37951	39586	34251	11992
Total Assets	169107	154684	145611	142862	168168	53067
Liabilities and Equity						
Liabilities						
Current	42209	42389	39024	25523	33507	10986
Non-Current	41762	38576	37980	53894	72036	27318
Total Liabilities	83971	80965	77004	79417	105543	38304
Equity						
Share Capital	156490	156604	154993	157299	157426	
Reserves	-64388	-75794	-78890	-87206	-88214	
Shareholders Funds						
Minorities	1811	1519	967	1227	1215	
Total Equity	85136	73719	68607	63445	62625	14763
Total Liabilities and Equity	169107	154684	145611	142862	168168	53067
Net Borrowings	46051	38871	36747	40700	62894	24387
Borrowings						
Total Borrowings	57349	46574	41421	52955	74718	19334
Short-term borrowings (Due < 1 Yr)	20260	12051	8513	4270	11826	2842
Long-term borrowings	37089	34523	32908	48685	62892	16492

The key financial ratios to evaluate the financial performance of Vodafone Group Plc over the last 5 years are **profitability**, **liquidity**, **gearing** and **efficiency** ratios.

Liquidity ratios

Measure the capability of a business to pay off their liabilities and debts. Briefly, it shows how easy it is to convert an asset into cash. The key amounts can be found in the balance sheet (Atrill and McLaney, 2008).

- **Current ratio**

Measures the ability to repay short-term obligations (within one year) with current assets (cash, inventories, and accounts earnings). This indicator is considered satisfactory when it receives values > 1 (Atrill and McLaney, 2008).

Current ratio = (Current assets_{total} / Current liabilities_{total}) × 100

	Vodafone [€m]						BT [£m]
	2016	2017	2018	2019	2020		2020
Current Ratio	84%	101%	97%	155%	102%		109%
Total current assets	35294	42737	37951	39586	34251		11992
Current liabilities	42209	42389	39024	25523	33507		10986

In 2016 the Vodafone's current ratio was 84% which meant that the total amount of current asset was 84% of the current liabilities. In 2017, they managed to 101% completely cover their short-term liabilities, while in 2018 felt slightly short by 97%. It has to be noted that in 2019, this ratio increased significantly to 155% while dropping again to 102% in 2020. This significant increase was due to the combination of slightly increased assets (by 4%) and significant lower liabilities (by 53%), than the previous years. In fact, between 18-19', there is a significant increase in cash and equivalent (80%), investment income (by 60%), and taxation recoverable (by 34%), while short-term debt is lowered by more than half. The subsequent current ratio decrease in 2020 was associated with the reset of debt to the usual higher levels, and slight decrease in assets.

BT presented a similar but slightly higher current ratio in 2020 (109%), with its current assets close to the current liabilities. Vodafone should safeguard the current ratio, and possibly increase it further, by focusing on both managing its debts and targeting successful investments.

- **Cash ratio**

Measures the ability of the business to repay short-term obligations with cash or cash equivalents (McLaney, 2006).

Cash ratio = (Cash_{or equivalents} / Current Liabilities_{total}) × 100

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Cash Ratio	31%	21%	6.9%	53%	40%	14%
Cash & other equivalents	12922	8835	2674	13637	13284	1549
Current liabilities	42209	42389	39024	25523	33507	10986

In the case of Vodafone, overall, the company is fully able to repay its obligations with cash, in varying degrees. From 2016 to 2018 there is a significant decrease of cash ratio, due to decrease in cash income (by 380%). From the annual report this is linked with ongoing tax legal cases, investing activates driven by current securities (Vodafone, 2018). However, in the fiscal year 2019, cash availability increased substantially fivefold (from €2674m to €13637m), mainly because of earnings on specific sales and investments.

BT's cash ratio, though, and assets in cash are much lower, almost ten times, than that of Vodafone. At the same time, its current liabilities are not as demanding resulting in a cash ratio of 14%.

- Quick Ratio

Measures the ability of a business to repay their short-term obligations with quick assets (thus excluding inventories) (McLaney, 2006).

Quick-test ratio = [(Current assets_{total} – Inventories) / Current liabilities] × 100

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Quick Ratio	82%	99%	96%	152%	100%	106%
Total current assets	35294	42737	37951	39586	34251	11992
Inventory	716	576	581	714	585	300
Current liabilities	42209	42389	39024	25523	33507	10986

From 2016 to 2019 we can see a considerable increase in the ability of Vodafone to meet its obligations with quick assets, reaching a quick ratio of 152%. In 2020 even though a decline was observed the company is still able to fully convert its assets quickly in cash to cover the liabilities. Once more the crucial parameter is the minimization of current liabilities from 2018 to 2019 by 53%, as explained in the current ratio. Overall, the numbers are characterized by a stability with minimal fluctuations. Vodafone could improve liquidity via (Newman, 2007):

- Decrease overhead costs.
- Create more sweep accounts.
- Get rid of unproductive assets.
- Assess regularly pricing policies.

Rival BT not only is characterized by lower current assets (£11992m of £300m inventory) but also by lower current liabilities (£10986m). This results in a quick ratio

similar to that of Vodafone, of 106%, in 2020. Between the two companies, for the fiscal year of 2020, it is observed that the overall liquidity of BT is marginally better than that of Vodafone. However, Vodafone's cash availability is much higher than that of BT, and cash is one of the most important parameters (cash is the king), putting Vodafone in a great liquidity position. Overall, both companies are above the sector average (IFRS, 2019).

Profitability ratios

These are implemented to evaluate the potential of the business to bring profits relative to turnover, operational expenses, balance sheet resources, and/or shareholder equity for a certain period. The highest the profitability ratios the more successful is the business. The required values can be found in the income statements (Arnold and Lewis, 2019).

- Gross profit margin

Indicates the percentage of turnover that surpasses the cost of goods sold. A high value is an indication that a business is generating earnings regardless of the costs.

$$\text{Gross Margin} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

Where Gross Profit = Revenue (net sales) – cost of sales

	Vodafone [€m]						BT [£m]
	2016	2017	2018	2019	2020		2020
Gross profit margin	26%	27%	30%	31%	32%		58%
Gross profit	13097	13055	13800	13506	14292		13258
Revenue	49810	47631	46571	43666	44974		22905
Cost of sales	36713	34576	32771	30160	30682		9647

When looking at the results it is evident that Vodafone has managed to keep a steady gross profit margin increase (from 26% to 32%) between 2016 and 2020. However, this is not necessarily attributable to the increase of revenues, which in fact are decreasing (by on annual average 4.5%), but rather to the control of the cost of sales, especially after 2017. In more detail, this drop of cost of sales which is approximately 7%, is linked in potential improved agreements on raw materials, shipping costs, labour, and commissions.

On the other hand, BT company has presented a significantly higher gross profit margin (58%) in 2020, even with half of Vodafone's revenue. This is due to the cost of sales being three times lower than that of Vodafone, while the gross profit is similar. It is evident that Vodafone will be greatly benefited if investing in further minimization of the cost of sales.

- Operating profit margin

Is calculated by the division of total revenue from operating profit, which is the gross profit minus the operation, administration, and overhead costs (bills, rents, salaries etc.), except the debt interest and taxation (Arnold and Lewis, 2019).

$$\text{Operating profit Margin} = \frac{\text{Operating Profit}}{\text{Sales}} \times 100$$

Where Operating Profit = Gross Profit - Operating Expenses

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Operating profit margin	2.7%	7.8%	9.2%	-2.2%	9.1%	16.1%
Operating profit	1320	3725	4299	-951	4099	3697
Revenue	49810	47631	46571	43666	44974	22905

From the results we see that there is a fluctuation on the operating profit margin percentages. From 2016 to 2018, there is an increase of 6.5 in units since the operating profit raised by 70% (from €1320m to €4299m). From the income statement, this increase is linked to the combining effect of slightly increase gross profit and improved administrative expenses. However, in 2019 a significant drop is observed in the operating profit (-€951m), which indicated that the operating expenses even exceeded the gross profit resulting in a negative operating profit margin of -2.2%. In 2020, the ratio recovered to the same percentages of 2018. The negative result was due to impairment loss (€3.5bn) mainly associated to the disposal of Vodafone India, post-merger with Idea Cellular in August 2018 (The Economic Times, 2019).

On the contrary BT presented an almost doubled operating profit margin in 2020 (16.1%). This is stems from the lower operating expenses, and thus BT is in healthier financial position than Vodafone. Vodafone should manage more efficiently the operating expenses and primarily those related to the selling, distribution, and administration.

- Net profit margin

This ratio reflects how much of the earnings become profits for the business, expressed as percentage. It is an important evaluation ratio since increases in turnover do not necessarily mean increased profitability.

$$\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Sales}} \times 100$$

Where Net Income (net profit, earnings) = Operating Income - (Interest + Taxes)

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Net profit margin	-10.3%	-4.1%	10.2%	-9.4%	-1%	7.6%
Net Profit for continued operations	-5127	-1972	4757	-4109	-455	1734
Revenue	49810	47631	46571	43666	44974	22905
Net Profit Margin (continued & discontinued operations)	-10.3%	-12.8%	6%	-17.5%	-1%	NA

There were two calculations for the net profit; one that involved only the continued operations and another one that also included the discontinued ones. It was decided, however, that for the purposes of the financial analysis the discontinued ones would not be included. In the case of Vodafone, would generate a significant disconnection between the financial image of the past and the present, due to one of events of unit shutdowns and subsidiary selling (Kennon, 2020).

The overall conclusion of the data is that Vodafone does not present a very positive financial image in terms of net profit margin. Meaning that the shareholders have lost from this investment. From 2016 until 2018 there is a significant improvement; from a negative -10.3% to a peak of positive 10.2%. As seen in the income statement this was due to increases of operating profit, investment income, and return of taxes in 2018. In 2019, the net profit plunged significantly (by 186%) to a negative -€4109m, resulting in a -9.4% net profit margin once more. This was associated with a non-existing operating profit, increased financing costs (interest on loans, overdraft charges etc.) and taxation then. In 2020 though the net profit loss is significantly smaller (-1%) indicating that Vodafone is on the right track to recover and potentially bring earnings to the shareholders, since operating expense have been improved.

BT, on the contrary, presents a healthy and high net profit margin of 7.6%. By comparing all the profitability ratios, it is clear that BT has a higher profitability than Vodafone. In comparison with the average profitability ratios of the sector, Vodafone present lower ratios apart from the operating margin (IFRS, 2019).

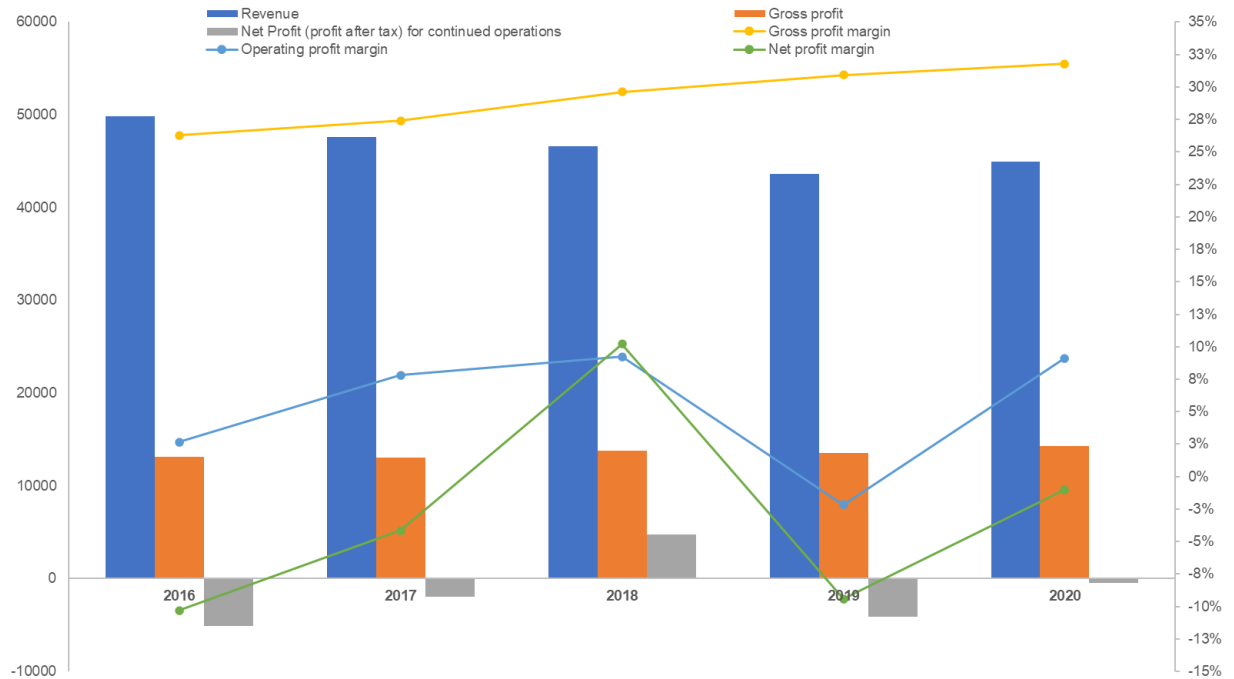


Figure 1: Vodafone's profitability variables and ratios.

Gearing ratios

Estimate the leverage ability of the company. High levels of business leverage indicate a greater risk to shareholders. The lower than one these ratios are, the more a company relies on each own capital (Collier, 2012).

- Debt to equity

This is calculated by the division of the total financial obligations of the business by the shareholders equity, found in the balance sheet. It measures the level in which a business is funding its operations via borrowing instead of owned finances. If the business goes into recession, this ratio illustrates how much will be the shareholder's equity coverage towards debts.

$$\text{Debt to equity ratio} = \frac{\text{Debt}_{\text{total}}}{\text{Equity}_{\text{total}}} \times 100$$

Where *Shareholder Equity* = *Assets* – *Liabilities*

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Debt to Equity Ratio	67%	63%	60%	83%	119%	131%
Total Borrowings	57349	46574	41421	52955	74718	19334
Total Equity	85136	73719	68607	63445	62625	14763

While observing the data, it is evident that Vodafone has been increasing the debt-to-equity ratio over the years from 2016 (67%) to 2020 (119%). This rise is more considerable after 2019, where the ratio is 83%, and surpasses the equity in 2020 with

119%. These ratios are dependent from the total borrowings, which are dropping between 2016 and 2018 (by 38%), whereas significantly increase in 2019 (by 22%) and 2020 (by 29%). In more detail, the short-term borrowings declined from 2016-2019, while the long-term ones are steadily increasing considerably by 40% until 2020. This is indicative of Vodafone's investments in its expansion to new markets and technology (5G) (Vodafone, 2020a). For instance, the property, plant, and equipment has seen an increase in 2020. As far as the equity fluctuations are concerned, it is dropping consistently in those 5 years (by 36%), due to continuous relative increase of the company's reserves. This means that Vodafone is retaining more and more of its earnings every year for future financial damage. In addition, from 2016 they have limited minorities interest. Vodafone increasing dependence in foreign capital (borrowing) has a dual effect; increasing risk for shareholders in the case of loss but also advantages in the gaining, control and expansion. Usually, borrowing is more beneficial than raising share capital (McLaney, 2006).

BT presents a heavy dependence on borrowings which is much higher than its equity, and that of Vodafone. Thus, BT's debt-to-equity ratio of 131% highlights an enhanced risk for shareholders if something goes wrong.

- Debt to capital

This is calculated by the division of the business's interest-yielding debt, borrowings (short and long-term) by the total capital (debt, shareholders equity).

$$\text{Debt to capital ratio} = \frac{\text{Debt}_{\text{total}}}{\text{Equity}_{\text{total}} + \text{Debt}_{\text{total}}} \times 100$$

This ratio can also be calculated using book or market values.

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Debt to Capital Ratio	40%	39%	38%	45%	54%	57%
Total Borrowings	57349	46574	41421	52955	74718	19334
Total Equity	85136	73719	68607	63445	62625	14763

As expected, this ratio is lower than the previous one because it shows how much is the debt against both equity and borrowings (as the company's whole capital available). From 2016 until 2020 there has been some fluctuations to this ratio with a small decrease until 2018 (38%) and a further increase in 2019 and 2020 to a peak of 54%. This highlights that foreign capitals have soared considerably in the final two years.

The current capital structure of BT shows that their debt is 57% of their total capital.

With this regards Vodafone has greater flexibility in raising supplementary capital through borrowings. Therefore, is a safer option as the financial leverage is lower than that of BT. A recommendation would be to manage borrowings more efficiently and for a good reason so that the company maintains its financial solvency. Also, could raise funds without diluting ownership (CFI, 2015).

Efficiency ratios

This is implemented to examine the short-term performance of a business in using their assets and liabilities internally. It can measure the earnings of receivables, pay off of debts, the amount and management of equity, and the overall usage of inventories and equipment (Collier, 2012). The needed values for this calculation can be found both in balance sheet and income statement.

- **Asset turnover**

Assesses the amount of the business revenue in relation to the value of its assets, which indicates the business efficiency in generating profits. The lower the asset turnover, the more inefficiently the business exploits its assets (Collier, 2012).

$$\text{Asset Turnover} = \frac{\text{Sales}}{\text{Total Asset}} \times 100$$

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Asset Turnover	29%	31%	32%	31%	27%	43%
Revenue	49810	47631	46571	43666	44974	22905
Total Assets	169107	154684	145611	142862	168168	53067

Overall, the asset turnover is not characterized by dramatical fluctuations over the years and maintained a value of 0.3. In practice, Vodafone has great room for improvement in the exploitation of its current and non-current assets. The stability in this ratio here is driven by the similar fluctuations occurring in revenue and total assets. It has to be noted, that the lowest asset turnover of 27% was reported in 2020. This happened because the revenue increased by 3% while the assets by 15%. The driving factors for the asset's fluctuations where primarily the dramatical drop of the company's intangible assets such as brand value and goodwill (2016-2019) by 43%. In 2020 Vodafone recovered by 24%. Other driving factors were investments, deferred tax liabilities, post employments benefits, provisions and other trades, alongside the current assets (cash taxation recoverable and assets held for sale) already explained. A recommendation could be to expand the company in markets with low taxation. BT, on the other hand is in a quite better position efficiency wise, since in 2020 has managed to present an asset turnover of 43%. Both of the companies could explore further options to activate their assets more efficiently since the sector average is

approximately 0.6 (Finbox, 2020).

- Fixed asset turnover

Measures the overall operational performance of the business, by comparing the net sales against fixed assets. It calculates the potential of the business to derive net sales from fixed asset investments (property, plant and equipment). A lower turnover ratio highlights that the business has not efficiently exploited their investments in fixed assets to bring profits (Arnold and Lewis, 2019).

$$\text{Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Total Fixed Asset}} \times 100$$

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
Fixed Asset Turnover	140%	158%	164%	159%	115%	124%
Revenue	49810	47631	46571	43666	44974	22905
Tangible (PP&E)	35515	30204	28325	27432	39197	18474

Over four years and until 2019 the tangible's value is decreasing dramatically reaching €27432m (drop by approx. 30% 2016-2019). Within a year their value went back by 30%, which meant that Vodafone gained quick earnings from the exploitation of plants, property & equipment. The first drop is due to unit closure, and property selling (India, Malta and Europe) (Vodafone, 2020a). The latter rise is due to Vodafone's heavy investment in new PP&E through increasing borrowing. In 2020, the company gained €1.15 revenue for every euro of fixed assets. This is considered low reflecting the high fixed asset power in telecommunications.

BT ratio has a similar number with Vodafone's, last year of 1.24. In relation with the five-year average of Vodafone's ratio is significantly lower, meaning Vodafone has a greater efficiency with regards to the tangibles. Vodafone could effectively further manage its assets to improve its financial condition.

- Return on Equity

Measures the company's return on capital spending by comparing the revenue to the capital spending, as percentage (Arnold and Lewis, 2019).

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Book Value of Equity}} \times 100$$

	Vodafone [€m]					BT [£m]
	2016	2017	2018	2019	2020	2020
ROE	-6%	-2.7%	6.9%	-6.5%	-0.7%	11.7%
Net Profit (profit after tax) for continued operations	-5127	-1972	4757	-4109	-455	1734
Total Equity	85136	73719	68607	63445	62625	14763
ROA	-3%	-1.3%	3.3%	-2.9%	-0.3%	3.3%
Net Profit (profit after tax) for continued operations	-5127	-1972	4757	-4109	-455	1734
Total Assets	169107	154684	145611	142862	168168	53067

- Return on Assets

Measures the company's return on capital spending by comparing the revenue to its assets, as percentage.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}} \times 100$$

PART C

1)

The **payback period (PBP)** is an investment evaluation method which illustrate the total time required by the cash flow to recover the initial investment or capital. Focus over here is on breakeven rather than profit (Collier, 2012). According to the task description in **Project A:**

Year	Cash Flow	Cumulative Cash Flows
0	-85	
1	10	10
2	20	(10+20) = 30
3	40	(30+40) = 70
4	55	(70+55) = 125

Initially the investment for project A is £85 million.

The company should calculate how much cash flow will project A generate up to a certain time.

In year 2, cumulative cash flow is £ (10m+20m = 30 m). In year 3, cumulative cash flow is £ (30m + 40m = 70 m), which means the company needs another £ (85m-70m = 15 m) to breakeven. However, 55m is to be received in year 4, but the company only needs 15m to breakeven. So, we divide the amount needed from the fourth year by the cash flow of the same year:

$$15/55=0.27 \text{ year.}$$

The payback period is therefore $3+0.27 = \mathbf{3.27 \text{ years}}$. This implies that the payback period for project A lies between year 3 and year 4 (first semester of the fourth year).

Project B

Initially the investment for this project B is £ 90 million.

- Year 1 the cumulative cash flow is £ 25 million
- Year 2 the cumulative cash flow is £ 25+30=55 million
- Year 3 the cumulative cash flow is £ 25+30+35=90 million

So, the payback period for the project B is **three years**.

As a decision tool, PBP is calculated to point out the most favourable investment opportunity with the shortest payback period which is safer from the investor standpoint

(McLaney, 2006); 'The quicker you get the money back the better'. Based on all the above, project B is better than A ($3 < 3.27$ years), in terms of PBP since the company will take the money back in less time.

The **accounting rate of return (ARR)** or in more financial terms return on capital employed (ROCE) is a formula that indicates the percentage ratio of pay back anticipated on an investment. The calculation requires dividing the project's average cash flow by the initial expenditure to obtain the return that one may expect over the lifetime of the project. The decision rule with regards to the realization of an investment has to do on whether ARR is equal or greater than the target one (Arnold and Lewis, 2019).

$$\text{Annual average accounting profit} = \frac{\text{total profit}}{\text{number of years}}$$

$$\text{ROCE (or ARR or ROI)} = \frac{\text{annual average accounting profit}}{\text{average capital employed}}$$

Or

$$\text{ROCE (or ARR or ROI)} = \frac{\text{annual average accounting profit}}{\text{Initial capital employed}}$$

Project A:

Total cash inflows (revenue): $10+20+40+55 = 125$ m

Total cash spending (cost): 85 m,

Total profit: $125-85 = 40$ m

Annual average profit: $40 \text{ m} / 4 \text{ years} = 10$ m

$\text{ROCE}_{I(A)} = 10 / 85 = 0.1176 \rightarrow 11.76\%$

Average investment is $(85+0)/2 = 42.5$ m

$\text{ROCE}_{\text{avg}(A)} = \frac{10}{[(85+0) \div 2]} = 0.235 \rightarrow 23.5\%$

Project B:

Total cash inflows (revenue): $25+30++35+40=130$ m

Total cash spending (cost): 90 m

Total profit: $130-90 = 40$ m

Annual average profit: $40 \text{ m} / 4 \text{ years} = 10$ m

$$ROCE_{I(B)} = 10 / 90 = 0.1111 \rightarrow 11.11\%$$

Average investment is $(90 + \text{scrap value}) / 2 = 45 \text{ m}$

$$ROCE_{\text{avg}(B)} = \frac{10}{[(90+0) \div 2]} = 0.222 \rightarrow 22.2\%$$

The company's target value is unknown. However, by comparing the two ARR there are not significant differences among them. Nevertheless, project A has a slightly higher ARR of 11.79% and thus is marginally preferred.

The **net present value (NPV)** method determines the current value of the cash inflows and outflows. It is dependent on the investment capital cost and illustrates the potential added value or not in the company's portfolio (Atrill and McLaney, 2008).

- if NPV is ≥ 0 (positive), then the project generates value.
- if NPV is ≤ 0 (negative), then if chosen this generates losses.

$$NPV_0 = -I + \frac{FV_1}{(1+i)^1} + \frac{FV_2}{(1+i)^2} + \text{etc.}$$

Where: I is the initial investment, $FV_1, FV_2, \dots, FV_n$ are the project's cash flow taking place in years 1, 2, $\dots, n$, i is the cost of capital or required rate of return.

Project A:

$$NPV_A = -85 + \frac{10}{(1+i)^1} + \frac{20}{(1+i)^2} + \frac{40}{(1+i)^3} + \frac{55}{(1+i)^4} \text{ (the cost of capital is at 10.5\%)}$$

$$NPV_A = -85 + \frac{10}{(1 + 10.5\%)^1} + \frac{20}{(1 + 10.5\%)^2} + \frac{40}{(1 + 10.5\%)^3} + \frac{55}{(1 + 10.5\%)^4} =$$

$$\rightarrow NPV_A = -85 + 9.05 + 16.38 + 29.64 + 36.89 \rightarrow NPV_A = 6.97$$

Project B:

$$NPV_B = -90 + \frac{25}{(1+i)^1} + \frac{30}{(1+i)^2} + \frac{35}{(1+i)^3} + \frac{40}{(1+i)^4} \text{ (the cost of capital is at 10.5\%)}$$

$$NPV_B = -90 + \frac{25}{(1 + 10.5\%)^1} + \frac{30}{(1 + 10.5\%)^2} + \frac{35}{(1 + 10.5\%)^3} + \frac{40}{(1 + 10.5\%)^4} =$$

$$\rightarrow NPV_B = -90 + 22.624 + 24.57 + 25.94 + 26.83 \rightarrow NPV_B = 9.964$$

Both NPV are positive so they will give a return greater than 10.5%. However, Project B will offer a higher return (thus more value for the company's shareholders) than Project A (10.5% + £ 9.96 m compared to 10.5% + £ 6.97 m).

Overall, from the calculation of the 3 parameters, the investment in which the company should choose is **Project B**, because has better PBP and NPV than Project A. Concerning the ARR evaluation, their similar values cannot act as a determining factor. In the long term, Project B offers shorter payback period and maximise of stakeholder's wealth.

2)

In order for a company to make an investment has to follow investment appraisal techniques via the calculation of several financial parameters. However, the evaluation requires the combining assessment of these both individually and in conjunction, since each one presents different practical and theoretical advantages and disadvantages (Harvard Business Review, 2016; Arnold and Lewis, 2019).

Advantages & Disadvantages of PBP

- It is simple, straightforward, and quick to calculate.

You only need a pen and a paper, or a calculator. Perfect for snap decisions.

- It is universally understood and widely communicated.

It is the easiest way to compare payback periods between potential investments.

- Assists in minimising the risk of poor investments.

The investment with the longest PBP bears higher risk than that with the shortest, which is of vital importance in smaller businesses of limited resources.

- Highlights the importance of project effectiveness and business liquidity in the decision making.

- Neglects the time value of money.

'a pound today is worth more than a pound a year later.'

- Ignores the cash flow received post payback period.

There are projects that may have larger payback periods but should be favoured due to the large cash flows that may come after that period.

- Neglects the projects profitability over liquidity.
- Ignores the project's return on the capital investment.

Advantages & Disadvantages of ARR

- Similar to PBP, it is simple to calculate, easy to understand and communicate.

- Provides the expected return in percentage, which can then be compared against the company's target.
- Examines the overall profitability of the potential investment, crucial for stakeholders.

It incorporates the total earnings or savings over the whole financial life cycle of the projects.

- Creates the concept of net profits.
- Recognises the perception of accounting profit.
- Useful tool to investigate the current performance of the project.
- Neglects the time factor of cash flows.
- Neglects the cash flows, but only the accounting profits.
- Neglects the time value of money.
- May introduce decision making issues, if ROI is calculated separately.
- Handles earnings obtained later in the project in the same way as those obtained in the beginning.

Advantages & Disadvantages of NPV

- It is the preferred method by academic in the financial world.
- Considers the time value of money.
- Allows risk parameters and cost of capital in the calculation.
- Considers the timing of the cash flow.
- Ability to compare and rank projects in terms of the projected value.
- More complex equation, harder to calculate and disseminate.
- Requires assumptions about future interest rates, cash transactions or uncertainties.
- Cannot compare investments of different size, due to being an absolute parameter.

It has to be noted, that none of the above financial evaluation techniques take into consideration any external, usually non-financial factors that may influence decision making and the choice of an investment. The issue is that those factors aren't easily translated and estimated by financial terms (Moutinho, 2011). Also, they are characterised by subjectivity, due to their intangible nature and quantifying limitations. These can be briefly summarized as the social responsibility, environmental and social policies, employment happiness, customer relationship, market. A good investment project should also combine (Dulce and Lopes, 1990; McLaney, 2006; Dalcher, 2012):

- The requirements of current and future regulations.

Major investments require some type of permissions, through funding, public queries, and regulations.

- Political stability.

The investment should preferably happen in a healthy and stable political background to safeguard its survival and development.

- Ethical practice and high industry standards.
- Positive current and projected relations with contractors and clients.
- Efficient human resource management.

Effective recruitment and retention of key employees.

- Bridges with local communities and focusing in improving its reputation.

Potential opposition by the locals, may cause delays or even cancellation of a potential project.

- Empowered management systems and managerial teams in place.

This can have an immediate remediate impact on a business, safeguard longevity and increase attractiveness.

- Clear growth strategy.

Stakeholders are interested in a dynamic business plan, with extensions of the customer platform, markets or even sales.

- Matching with the company's overall portfolio.

How the potential investment project fits in the company's profile, activities and goals.

- Proactivity and protection against potential obstacles and market competition.
- Consideration of environmental impact.

Today's investments should not only comply with environmental requirements, but also minimise their footprint to be sustainable.

- Low risk from technical/ technological factors.

If a project fails to incorporate the latest technical/technological developments may result in delays, extra costs and even failure.

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