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**BA (HONS) BUSINESS MANAGEMENT  
FINANCIAL ACCOUNTING YEAR 2 - ASSIGNMENT ONE**

**HEYWORTH LTD.**

The appraisal techniques of Accounting Rate of Return (ARR), Payback, Net Value, Net Present Value (NPV) and Internal Rate of Return (IRR) will be examined in this paper. The strengths and weaknesses of each technique will be evaluated and compared against one another in order to determine which is the most suitable aid to the decision making process in the context of Heyworth Ltd. The context is Heyworth LTD's desire for financial growth through investment. Several proposals have been submitted of which we will use one in order to illustrate the calculation and effectiveness of each technique. An in depth accurate project appraisal is needed in light of the substantial capital investment required. In order to ensure an informed, objective and logical decision making process, the company must ensure the implementation of the most effective and suitable project appraisal technique, together with accurate forecasts and wise risk assessment.

**Accounting Rate of Return**

ARR can be defined as "the ratio of profit before interest and taxation to the percentage of capital employed at the end of a period. Variations include using profit after interest and taxation, equity capital employed, and average capital for the period"  
(PowerHomeBiz.com, 2006)

$$\text{ARR}\% = (\text{Average Net Cash Flow} / \text{Initial Capital Cost}) \times 100$$

$$\text{Average Net Cash Flow} = \text{£}520,000 / 6 \text{ years} = \text{£}86,667$$

$$\text{ARR}\% = (86666.70 / 300,000) \times 100 = \underline{28.9\%}$$

A capital investment of £300,000 produces an ARR of 28.9% over a lifespan of 6 years. This percentage figure shows Heyworth Ltd the additional cash that the company will be able to produce by accepting the proposal of investing £300,000 in new machinery.

**Advantages of Using ARR in the Decision Making Process:**

- Easy to calculate
- Uses two key accounting terms, making it relatively easy to understand

### **Disadvantages of Using ARR in the Decision Making Process:**

- Does not fully reflect the strategic orientation of the decisions which are being appraised.
- The fact that this technique relies on averages means it will not reflect the pattern of yearly returns which may be vital when considering projected cash flows and reported profits.
- The ARR does not take into consideration the time value of money. The technique regards £1 spent three years ago as having equal value to £1 spent today.
- ARR is arguably inefficient in terms of strategic orientation.
- The technique does not have a universal definition. Two possible definitions state that ARR may be calculated using Initial Capital Cost as the basis of the calculation or Average Capital Cost. Hence depending on how it is defined, it may produce very different results which may lead to very different decisions affecting Heyworth Ltd.
- The ARR technique produces a percentage which cannot reflect the size of the proposal or indicate the benefits or the damage of venturing on this substantial capital investment. The use of percentages can arguably cause confusion where there is a choice between different proposals.

### **Payback**

“An estimate of how long it will take before the cost of a capital investment project is covered by the future net cash flows arising from that project” (Pearson Education 2004)

### **Payback for Proposed £300,000 Investment in New Machinery by Heyworth ltd.**

<b>Yr.</b>	<b>Net Cash Flow (£)</b>	<b>Cumulative Net Cash Flow (£)</b>	<b>Remainder to be paid before full payback (£)</b>
1	60,000	60,000	240,000
2	70,000	130,000	170,000
3	100,000	230,000	70,000
4	120,000	350,000	

(Last Remainder/Net Cash Flow) x 52 (weeks) = Remainder

$(70,000/120,000) \times 52 = 30.3$  weeks

The payback period for the £300,000 capital employed to purchase the machinery will be 3 years 30.3 weeks. After this payback period Heyworth Ltd will have earned back the £300,000 investment. These results allow management at Heyworth to judge the risk

involved in this particular proposal. After the payback period the £300,000 will be available for reinvestment.

### **Advantages of Using Payback Method in Decision Making**

- Payback is simple to calculate and understand
- Payback is practical in proposals where high risk investments are involved such as in fast changing markets or where cash flows are difficult to forecast..
- This technique is commonly implemented together with NPV or IRR and acts in the screening process to pinpoint attractive proposals.
- It is a useful way of summarising how fast the initial investment will be recovered.
- This technique concentrates on cash flows, which are more objective than profit
- Due to the fact that it is simple and fast, it can prove useful in situations where there are numerous proposals. In this case the criterion would be a shorter than target payback period.
- Payback can be especially significant where a business has liquidity issues. In this scenario a short payback period would be essential so that the remaining proposed cash flows may improve the company's overall cash flow situation.
- Payback can help management assess whether risky ventures are worth embarking upon or not. If an investment is considered high risk the company will be looking at recovering its initial capital investment as soon as possible in order to avoid further risk.

### **Disadvantages of Using Payback Method in Decision Making**

- As with ARR, Payback neglects the time value of money
- Once the payback period is determined, cash flows arising after that period are removed from the analysis. This can be very misleading, as it could result in the company accepting a proposal's simply because it has heavy cash inflows in its earlier years and completely disregarding the latter stages. It could also lead to Heyworth ltd. rejecting proposals which happen to have a long payback period but are extremely desirable over their full lives.
- Like ARR Payback does not indicate the amount of capital investment required and does not indicate the cost and/or benefits of accepting or rejecting this particular proposal. These shortcomings mean that comparison of proposals based on payback may be extremely misleading.

### **The Discount Rate and Net Present Value**

Setting an appropriate discount rate is vital when calculating the Net Present Value. An effective way of setting the discount rate is deciding the rate that the initial capital invested could return if used in an alternative proposal. NPV value which is calculated using variable discount rates throughout the lifespan is more accurate than if it is calculated from a constant discount rate for the entire investment lifespan.

If the investment capital is committed to a target rate of return, that rate of return should be selected as the discount rate when calculating the Net Present Value. This will allow management to make an objective comparison between the profitability of each proposal and the desired rate of return.

**Net Present Value (NPV)**

“The difference between the present value of the cash inflows and the present value of the cash outflows associated with an investment project” (McGraw-Hill Ryerson 2001).

Net Value and Net Present Value for £300,000 New Machinery Investment Proposal

Yr.	Detail	£	Discount Factor	NPV (£)
0	Initial Capital Cost	-300,000	1	-300,000
1	Net Cash Flow	60,000	0.943	56,580
2	Net Cash Flow	70,000	0.89	62,300
3	Net Cash Flow	100,000	0.84	84,000
4	Net Cash Flow	120,000	0.792	95,040
5	Net Cash Flow	90,000	0.747	67,230
6	Net Cash Flow	80,000	0.705	56,400
6	Residual Value	15,000	0.705	10,575
		<u>235,000</u>		<u>132,125</u>

Residual Value = 5% of £300,000

Residual Value =  $(300,000/100) \times 15 = £15,000$

$£235,000 - £132,125 = £102,875$

The Net Financial Gain can be calculated by adding the net cash flows and the residual value and then subtracting the capital cost. According to the figures, the Net financial gain of this proposal would be £132,125 (once the Discount Factor has been taken into account). The Net Present Value of this particular proposal seems acceptable as it is substantially positive. Any proposal which produces a negative NPV should be avoided as it predicts a loss of capital.

Net Present Value is arguably one of the strongest tools available to analyse any type of investment or financial activity. NPV has four key benefits when used to evaluate a possible investment:

### **Benefits to Heyworth ltd. of Using NPV as an Aid to Decision Making**

- NPV incorporates all cash flows over the proposal's life cycle, as opposed to solely dealing with averages, and recognises the time value of money reflected in the discount factor seen in the above calculations.
- The technique takes into account the risks involved in an investment through expected cash flows and/or discount rate.
- NPV offers a degree of flexibility and depth, since the equation can be adjusted for inflation and can be used with other financial tools such as Scenario analysis and the Monte Carlo simulation.

A comparative study of appraisal techniques used by 100 large UK businesses during the 1980s suggests that Discounted Cash Flow Techniques such as NPV were increasingly used by successful companies during this period.

	1975 %	1981 %	1986 %
IRR	44	57	75
NPV	32	39	68
ARR	51	49	56
Payback	73	81	92

(Upchurch, 1988 p.p.337)

### **Considerations When Using NPV as an Aid to Decision Making**

Despite its many benefits, NPV has some problems of which Heyworth ltd needs to be aware.

- NPV analysis consists of two main inputs: cash flow and cost of capital. The Cash Flow represents a forecast. Determining the cash flow generated from an investment that has not yet been made is not an easy task, considering the number of assumptions and expectations underlying the calculation.
- Furthermore, the cost of capital or discount rate is also an estimate. Using a standard discount rate where all projects are discounted using a standard rate, despite their different risks, may undervalue or overvalue the project, decreasing the overall accuracy.

- The NPV does not reflect the effects of borrowing or raising the necessary £300,000 capital for this particular project.
- The capital required for the proposal could change with time, which would require decisions that may increase or decrease the risk of the investment. Hence NPV uses data known at the time of the analysis. The result is calculated in a static manner, not allowing for future changes. This inherent rigidity may underestimate the value of some ventures.

NPV is arguably the most appropriate tool to evaluate Heyworth LTD's proposed investment. However, the various inputs and assumptions made in the equation determine the quality of the result.

### **Internal Rate of Return (IRR) and Decision Making**

“The Discount rate yielding a zero NPV” (Upchurch, 1988). A proposal is considered acceptable, according to this technique, if its Internal Rate of Return is larger than the rate of interest that could be earned through other investments, such as other projects, acquisition of bonds and bank interest.

- Internal rate of return will not reflect the size or the scope of a potential investment. This is vital when dealing with two mutually exclusive investment proposals.
- When there is more than one change in the direction of the cash flows it is possible to have two internal rates of return. This may lead to uncertainty and confusion within the company.

### **NPV Compared to IRR**

The popularity of the IRR method is popularity is arguably due to its simplicity when compared with the net present value method. “The NPV method is inherently complex and requires assumptions at each stage - discount rate, likelihood of receiving the cash payment, etc. The IRR method simplifies projects to a single number that management can use to determine whether or not a project is economically viable. The result is simple, but for any project that is long-term, that has multiple cash flows at different discount rates, or that has uncertain cash flows - in fact, for almost any project at all - simple IRR isn't good for much more than presentation value” (Investopedia, 2007).

The Internal Rate of Return technique does not consider the size of the investment which is required. Furthermore, IRR does not take into account the profit or loss which will occur from this substantial investment.

“IRR's major limitation is also its greatest strength: it uses one single discount rate to evaluate every investment. Although using one discount rate simplifies matters, there are a number of situations that cause problems for IRR” (Investopedia, 2007)

The Internal rate of Return will not accommodate for any changes in the discount rate during the life span of the proposal. If changes do occur, then there will be more than one target return against which to measure the IRR. This renders IRR useless when trying to determine whether the proposed investment is acceptable or not over its full life. NPV caters for such changes by allowing management to use the present value factors appropriate to the changed discount rate.

“Determination of IRR is often a matter of trial and error, and the result can be much less precise than Net Present Value” (Upchurch, 1988). This can affect the acceptability of proposals.

NPV assumes that project cash inflows are reinvested to earn a return equal to the discount rate compared to IRR which assumes reinvestment at the proposal's internal rate of return. The theory would indicate that IRR has serious shortcomings when compared to NPV.

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