Rivets Ltd

Investment Appraisal Report

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Executive Summary

This report is aimed at highlighting alternative investment appraisal methods by comparing existing methods based upon the data of the Computer Projects and Project XYZ. It identifies the reasons as to why it would be more efficient to implement and provides suitable examples in comparison with Denise's figures.

In summary, here are the results for the IT Projects and Project XYZ.

- **XYZ Project -Recommended**
- **NPV; £98,610**
- **Risk/Variance; £136**

- **Purchase of New IT Software**
- **NPV; -£471,621**

- **Improvements to Old Software - Recommended**
- **NPV; -£466,607**

1.0 Introduction

1.1 - Terms of Reference

This report is the result of an investigation by Finadvice Associates into the Investment Appraisal techniques currently used by Rivits Ltd in order to evaluate and suggest possible alternatives, which may be less time-consuming in the coming year.

1.2 - Procedure

This report will illustrate alternative appraisal methods to evaluate possible investment decisions.

In addition it will: -

- **Highlight the Net Present Value (NPV) method and show how it works in practice**
- **Compare it with the present system used by rivets Ltd**
- **Identify other areas of note with respect to Rivits Ltd when evaluating investment decision**
- **Recommend how Rivits Ltd should proceed**

2.0 Net Present Value (NPV)

2.1 What it is.

The Net Present Value technique is an Investment Appraisal tool, which takes account of all the costs and benefits of each investment opportunity and makes a logical allowance for the *timing* of those costs.

2.2 How it works.

The technique works by *discounting* a project's cash flows by the Cost of Capital set by the organization. Discounting means stating them in today's terms – what they are worth to the company *now* i.e. at the time the investment decision is to be made. This Cost of Capital takes into account such things as the amount of risk (of not getting the return that was envisaged), inflation, the opportunity cost (what could be earnt elsewhere), the cost of borrowing and the expected return from the project.

Once the cash flows have all been stated in today's terms they are added together and the result is the Net Present Value. If this figure is a positive one, the organization should accept the proposal, as it will add to shareholder value by that amount (according to theory). This is based upon certain assumptions later explained in 4.0. When there is more than one mutually exclusive projects, the project with the highest NPV should be accepted. In the case of Rivits Ltd, it can be seen from Appendix……. that the improvements to the old computer software produced a higher NPV (or in this case a lower negative) than did the purchase of new software. Therefore the correct decision would be to improve the old software.

The key criteria when calculating the NPV of a project is that only *incremental* cash flows are used. These are those cash flows, which are dependent upon the project's implementation. Any expenses, for example, which would have occurred anyway or had already been committed, are disregarded. Therefore the share of factory overheads should not be included as these would have had to have been paid anyway and likewise the monies paid or committed for the IT projects should not be included as, again, they will have to be paid regardless of whether the project goes ahead or not.

The interest on funds borrowed to invest in a project is also disregarded, in absolute terms, as the *incremental* cost is included in the Cost of Capital used to discount the cash flows.

Conversely, any positive cash flows, which have been lost as a result of taking on the project, for example the amount of rent foregone from a factory unit that now cannot then be rented out, should be included.

Once the relevant cash flows have been ascertained we can be sure that all those, and only those, cash flows that relate to the project have been included in the investment decision.

3.0 Comparison with Present System

3.1 – Description of Present System

The 'system' currently used by Rivits Ltd is one of discussion and consensus. Estimated costs and incomes are put together and the proposed project is discussed at board level and, it seems, a majority decision is taken whether to proceed.

There are advantages with Rivit's present system, as there are with all methods, not least the fact that it is easy to understand and therefore simple to communicate to senior managers responsible for operating the project.

3.2 – Advantages of NPV

One advantage of using NPV is that we can be sure that we are using the correct costs and incomes in our evaluation because, as stated above, only *incremental* and *relevant* costs are included. In implementing relevant costs we produced a cash flow of £338,100 (A.2, Sum total of net cash flows for most likely scenario), compared with Denise's value of £130,000. Her figures were simply the 'Contribution to Profit' generated by the project, which, as we will hopefully make clear, should not be used for decision-making purposes.

The benefit of NPV is that it uses *cash flows* rather than profits. Rivits Ltd have set out their calculations for the XYZ project using 'Contribution to Profits', which include such things as machine depreciation. This is a non-cash item affecting profit but not cash flows. The amount of these non-cash items can be affected by differences in accounting policies and conventions and so can be open to manipulation when making an Investment Appraisal decision.

Probably the most significant advantage of Net Present Value (along with another technique known as the Internal Rate of Return, IRR – see N1) is that they both make use of the *time value of money*. This means that they value monies received in earlier years higher than monies received later because they realise that time has a value. That value is the cost of any opportunity foregone whilst waiting for the monies to come in. By revising the previous cash flow figures to take account of time we produced a new NPV of £137,213

Although both the NPV and IRR methods utilize the time value of money concept, the IRR does have certain drawbacks over NPV. For example, it gives no significance to the *scale* of the project as it measures viability in percentage terms and therefore does not give greater weighting to larger projects.

Also the IRR method assumes that a firm can re-invest it's cashflow at the same IRR on different projects. This is clearly unrealistic.
It also has difficulty in situations where 'non-conventional' cash flows occur, for example net cash outflows in later years, when it produces two entirely different IRR's. For these reasons the net present value method is technically *superior* to all other methods.

There are no adjustments for the effect of taxation on the figures supplied by Rivits Ltd. This is a major drawback with that system as taxation can have a significant impact on the viability of a project. As can be seen from Appendix A. 1 and Appendix A.2 the marginal effect (that is the effect on taxation of going ahead with the project) is included in our calculations, which in some cases is a Saving, and in others a Cost.

4.0 Other areas of note

When assessing whether a project should go ahead, a number of things should be considered over and above the amount of any Net Present Value. The NPV should be seen as a starting point in any decision-making rather than the decision itself.

4.1 – Internal Influences of the Firm

The objectives of the company should be considered: is shareholder wealth maximisation what the company desires in the short term or is it prepared to relinquish some shareholder value in the short term in order to boost growth and possibly increase it in the long term.
In the case of Rivits Ltd, the firm's objective of growth is likely to produce a shortage of cash in that a good proportion of it's cash reserves could be being used to fund expansion. We are not made aware of the company's cash situation but if indeed it is short of cash it might be better to look to techniques which minimize the firm's exposure to risk and focus on the return of any cash investment in the shortest possible time (see N1 for the Payback method).

The projects should never be viewed in isolation and determining whether a single project is too risky to accept should be taken into context with the other projects being undertaken by the firm. For example, if a firm has a large amount of low-risk activities currently in operation, it may be willing to accept a high-risk project if the overall returns were large. On the other hand if a firm has a large number of risky projects, it may be unwilling to accept further projects unless they were low-risk.
In addition, the companies existing product portfolio, may include projects with an NPV much greater than XYZ. Therefore does XYZ match up to the rest of the portfolio or are there other projects around which could possibly generate higher NPV's?

We have stated that a project should not be accepted if it produces a negative NPV. This is clearly not a reasonable statement in the case of our assessment of the Computer Software decision. Both scenarios produce negative NPV's as they have very few cash inflows.
However where a project produces a negative NPV there may be other spin-off benefits to the organization in accepting the project which perhaps cannot be valued for decision-making purposes – it could lead to the firm gaining a lucrative contract for example.

4.2 – External Influences on the Firm

The possible difficulty in raising the finance required to undertake the project should also be examined. Rivits Ltd is a highly geared company with more debt capital than equity capital. This makes it, in the UK at least, a less attractive target for potential lenders so they will

require a Risk Premium in order to facilitate the loan. This, in turn, makes it more expensive for the company to undertake the project. (Incidentally a highly geared company is viewed favourably on the continent as lenders see that other lenders have lent to it and so consider it less of a risk!). If the firm had a number of possible projects with positive NPV's but could not finance them all, it would have to undertake a process known as Capital Rationing to ascertain which projects to proceed with.

Another factor to be taken into consideration is the uncertainty factor. How reliable are our figures? Has any possible downturn in the economy been factored into the forecasts? Are there any changes, for example in the tax structure, about to occur that are likely to affect the firm?

4.3 – Sensitivity Analysis

We have used in our calculation a Cost of Capital figure of 7%. We would suggest some thought be given to whether this figure is realistic. In Fig. 1, Pg11, we have conducted some Sensitivity Analysis to see what would happen if we increased the discount rate. It can be seen that the cost of capital can rise by 66% to a discount rate of 11.62% before the NPV falls to zero. Therefore is the 7% a sensible target rate to apply? Is it high enough to encapsulate the cost of borrowing (bearing in mind the above), the amount of risk (see Appendix A.3), the opportunity cost of possible projects foregone and the expected return on the project? We have however produced a figure representing risk and estimate that the actual outcome of the project may vary by £135.34 of the Expected NPV. This clearly indicates a low risk associated with the project.

Fig. 1 also indicates the effect of changes in variables such as Labour Costs, Material Prices and Sales Revenue.

4.4 – Alternative Appraisal Methods

There are other Investment Appraisal methods available which may provide a more suitable basis for evaluating the project, depending on the circumstances of the individual company. (See N1)

Fig. 1 – Sensitivity Analysis (Explanation in N.2)

5.0 – Conclusion

This report has been constructed with the aim to aim to highlight the current decision making process, its strengths and weaknesses, and how NPV could benefit the firm. We haven taken into consideration that the current system is easy to understand, which is necessary in a fast environment. It also highlights profitability, which is key to any firm's objective. However we believe NPV carries considerable advantages in the firms favour as noted below.

Firstly we addressed the time wastage problem by creating an independent worksheet that would complete all calculations after the inputs had been processed. This will enable a faster decision making process, making the firm more flexible to adjust with market conditions.

Secondly, NPV has highlighted crucial factors such as; relevant cash flows, discount of time, risk and taxation that can have serious implications upon the viability of an investment. The result is a decision making process based upon a true and more accurate insight into the projects lifetime.

Finally, we identified several other investment appraisal techniques that would support decision-making such as IRR, Payback and ARR. Together; these inputs aim to provide a true scope into the projects viability.

6.0 – Recommendations

Based upon the data provided Finadvice Associates Recommend Rivits Ltd to;

- **Make improvements to the current IT system. This decision is based upon a NPV figure of -£466,600 compared with -£471,600 for a new system. It also removes the need for employees to adapt to the new system, a process that can waste time and make considerable errors.**
- **Undertake the XYZ project. This project produces a positive NPV of £98,610 with a variance (risk) of only £134. These figures have been the result of several processes to eliminate; risk and, variances in input costs or sales revenue that could result in non-profitability.**

However it must be taken into consideration that these estimates have been produced in the absence of several sources of data such as, company's objectives, existing product portfolio, firm's liquidity, economic conditions or any market research. As a consequence, this result has largely been based upon statistical analysis of the projects and therefore must be viewed accordingly.

Appendix

A.1 – NPV Calculations for IT Software

Purchase of New IT Software (£000's)

Year (Tax Calculation)	0	1	2	3	4	5
Purchase of Equipment	-800					
Development Costs		-50				
Written Down Allowance (WDA)		-200	-200	-200	-200	
Cost Savings						
- Accounted		40	40	40	40	40
- Redundant Employee		15	15	15	15	15
Total	-800	-195	-145	-145	-145	55
Tax @ 30%		-58.5	-43.5	-43.5	-43.5	16.5
NPV						
Cost	-800					
Development Costs		-50				
Cost Savings						
- Accounted		40	40	40	40	40
- Redundant Employee		15	15	15	15	15
Tax Saving		-58.5	-43.5	-43.5	-43.5	16.5
Cash Flows	-800	63.5	98.5	98.5	98.5	38.5
Discount Factor	1	0.9346	0.8734	0.8163	0.7629	0.713
Discounted Cash Flow (DCF)	-800	59.3471	86.0299	80.40555	75.14565	27.4505
Net Present Value (NPV)						**-471.621**

Improvements to Old IT Software

Year	0	1	2	3	4	5
Development Fee		-510	-60	-60	-60	-60
Tax Saving @ 30%	0	-153	-18	-18	-18	-18
Net Cash Flows	0	-357	-42	-42	-42	-42
Discount Factor	1	0.9346	0.8734	0.8163	0.7629	0.713
Discounted Cash Flow	0	-333.652	-36.6828	-34.2846	-32.0418	-29.946
Net Present Value (NPV)						**-466.607**

A.2 – NPV Calculations For XYZ Project

XYZ Project (Worst Case Scenario) (£000's)

Year	0	1	2	3	4	5
Capital Expenditure	-800					
In-house Development		-200				
Sale Proceeds		1800	1800	800		
Disposal Proceeds						
Raw Materials		-1125	-1125	-500		
Direct Labour		-300	-300	-120		
Net Cash flow before Taxation	-800	175	375	180	0	0
Taxation (W1)		-7.5	52.5	-6	-60	0
Net Cash Flow	-800	182.5	322.5	186	60	0
Discount Factor	1	0.9346	0.8734	0.8163	0.7629	0.713
Discounted Cash Flows	-800	170.5645	281.6715	151.8318	45.774	0
NPV						**-150.158**

W1 - Taxation

Net Cash flow before Taxation	-800	175	375	180	0	0
Less WDA		-200	-200	-200	-200	
Taxable Income		-25	175	-20	-200	0
Tax e 30%		-7.5	52.5	-6	-60	0

XYZ Project (Most likely Scenario) (£000's)

Year	0	1	2	3	4	5
Capital Expenditure	-800					
In-house Development		-200				
Sale Proceeds		1800	1800	1600	1400	640
Disposal Proceeds						8
Raw Materials		-1125	-1125	-1000	-875	-400
Direct Labour		-360	-320	-260	-200	-100
Net Cash flow before Taxation	-800	115	355	340	325	148
Taxation (W1)		-25.5	46.5	42	37.5	44.4
Net Cash Flow	-800	140.5	308.5	298	287.5	103.6
Discount Factor	1	0.9346	0.8734	0.8163	0.7629	0.713
Discounted Cash Flows	-800	131.3113	269.4439	243.2574	219.3338	73.8668
NPV						**137.2132**

W1 - Taxation

Net Cash flow before Taxation	-800	115	355	340	325	148
Less WDA		-200	-200	-200	-200	
Taxable Income		-85	155	140	125	148
Tax e 30%		-25.5	46.5	42	37.5	44.4

XYZ Project (Best Case Scenario) (£000's)

Year	0	1	2	3	4	5
Capital Expenditure	-800					
In-house Development		-200				
Sale Proceeds		1800	1800	1800	1800	600
Disposal Proceeds						18
Raw Materials		-1125	-1125	-1125	-1125	-375
Direct Labour		-300	-240	-240	-240	-120
Net Cash flow before Taxation	-800	175	435	435	435	123
Taxation (W1)		-7.5	70.5	70.5	70.5	36.9
Net Cash Flow	-800	182.5	364.5	364.5	364.5	86.1
Discount Factor	1	0.9346	0.8734	0.8163	0.7629	0.713
Discounted Cash Flows	-800	170.5645	318.3543	297.5414	278.0771	61.3893
NPV						**325.9265**

W1 - Taxation

Net Cash flow before Taxation	-800	175	435	435	435	123
Less WDA		-200	-200	-200	-200	
Taxable Income		-25	235	235	235	123
Tax e 30%		-7.5	70.5	70.5	70.5	36.9

A.3 – Weighted NPV & Risk Factor

Weighted NPV (£000's)

Year	0	1	2	3	4	5	NPV	Probability (Pi)
Scenario								
Worst Case	-800	170.5645	281.6715	151.8318	45.774	0	**-150.158**	**0.2**
Most Likely	-800	131.3113	269.4439	243.2574	219.3338	73.8668	**137.213**	**0.7**
Best Case	-800	170.5645	318.3543	297.5414	278.0771	61.3893	**325.927**	**0.1**

Scenario	NPV	NPV x Pi	(NPV-ENPV)	$(NPV-ENPV)^2Pi$
Worst Case	-150.158	-30.03164	-248.768415	12377.14
Most likely	137.2132	96.049205	38.602935	1043.131
Best Case	325.9265	32.59265	227.316285	5167.269
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Expected NPV (ENPV) = 98.610215 (£000's)

18587.54 = Variance

√ **18587.5 = Standard Deviation**

= Standard Deviation

Or £ 98610.215 **136.34 Or Risk**

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Student links @ www.uwe.ac.uk

Blackboard @ www.uwe.ac.uk

Notes to Report & Abbreviations

N.1 – Additional Investment Techniques

There are other Investment Appraisal techniques available, which are summarised below:

- **Payback is the length of time needed for the anticipated net revenue from a project to 'pay back' the initial cost**
- **Discounted payback uses the same method but with cash flows discounted back to their present values.**
- **Accounting Rate of Return can be calculated in a number of ways but the one, which gives the more accurate result, is Average Annual Profit divided by the Average Capital invested. It should be noted that this method uses profit rather than cash flows.**
- **Internal Rate of Return (also known as the yield) is the rate of return, which results in the present values, together with the initial outlay, adding to zero. The project should be accepted when the IRR is above the target rate set by the company.**

N.2 – Explanation of Sensitivity Analysis

In this graph, the 0% integer upon the x-axis indicates the current discount rate of 7% and thus the Expected NPV. By looking at each curve individually we can identify how a growth or reduction in each variable would affect the expected NPV. For example, if labour costs were to increase above 15%, the expected NPV would fall below zero and the project no longer viable.

N.3 – Abbreviations

NPV – Net Present Value

IRR – Interanl Rate of Return

ARR – Accounting Rate of Return

Pi – Probability Factor

WDA – Written Down Allowance

Tax e –Tax Payable

N.4 – Word Count

2115 Words