Financial Analysis of the Automated Material Handling Project

Although most companies have their own financial justification for projects, there are six traditional methods used to evaluate projects that TriFactor has performed as part of this analysis:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Modified Internal Rate of Return (MIRR)
- Profitability Index (PI)
- Payback
- Discounted Payback

TriFactor used the parameters and variables supplied by SAMPLE DISTRIBUTING CO. when entering data for these analyses. They were:

- Estimated Full Time Equivalent (FTE) reduction as a result of the project: 12 FTEs (6 per shift x 2 shifts)
- Fully burdened cost of an FTE: $30,000
- Anticipated annual labor savings: $360,000
- Any other annual savings as a result of the project (minimize returns, inventory expiration, etc.): $20,000 in waste savings and reduced damaged products
- Anticipated increase in annual net profits as a result of the project: $15,000 year 1 with 10% growth each year thereafter
- SAMPLE DISTRIBUTING CO.'s cost of capital, r: 7%
- SAMPLE DISTRIBUTING CO.'s savings rate, s: 2%

Additionally, TriFactor developed a 5 year cash flow as a result of implementing the project as the basis for the financial analysis. The Year 0 figure represents the initial cost of the system of **$1,316,200.00** which was provided by SAMPLE DISTRIBUTING, CO. The subsequent Years 1 through 5 figures represents the sum of the annual labor savings, other savings and increase in profits as a result of implementing the project.

Initial Cost:	$	1,316,200.00
Annual Labor Savings:	$	360,000.00
Other Annual Savings:	$	20,000.00
Annual Increase in Profits:	$	15,000.00

Annual Cash Flows						
Year	0	1	2	3	4	5
Annual Cash Flow	$ (1,316,200.00)	$ 395,000.00	$ 396,500.00	$ 398,150.00	$ 399,965.00	$ 401,961.50

Net Present Value (NPV)

The NPV method is based on the evaluation of the discounted cash flow as a result of the project. To find the NPV, we find the present value of each cash flow, including the negative cash flow resulting from the initial cost of the project, and discount all other cash flows at the project's cost of capital, *r*. We then sum these discounted cash flows and determine the NPV. If a project has a positive NPV, then it adds value to SAMPLE DISTRIBUTING CO. The formula for the 5 year NPV is as follows:

$$NPV = \left[\frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \frac{FCF_3}{(1+r)^3} + \frac{FCF_4}{(1+r)^4} + \frac{FCF_5}{(1+r)^5} \right] - Initial\,Cost$$

The NPV of the project equates to: $295,337.11

Internal Rate of Return (IRR)

The Internal Rate of Return is defined as the discount rate that forces the NPV to equal zero. The purpose for analyzing the IRR is to determine if the discount rate that forces the NPV to equal zero is more than the "hurdle rate", which is common for companies to be their cost of capital. For example, if the cost of capital is 10% and a project's IRR is 15%, then implementing the project would be a beneficial investment to SAMPLE DISTRIBUTING CO. The formula for the 5 year IRR is as follows:

$$NPV = \frac{FCF_1}{(1+IRR)^1} + \frac{FCF_2}{(1+IRR)^2} + \frac{FCF_3}{(1+IRR)^3} + \frac{FCF_4}{(1+IRR)^4} + \frac{FCF_5}{(1+IRR)^5} - Initial\,Cost = 0$$

The IRR of the project equates to: 15.56%

Modified Internal Rate of Return (MIRR)

The Modified Internal Rate of Return is defined as the discount rate that forces the NPV to equal zero but taking into consideration that all future inflows of cash is reinvested at a savings rate, *s*. Although a slightly more complicated calculation when compared to the IRR, it is a better indicator of relative profitability of the project and associated cash flows. Similar to the IRR method, the MIRR discount rate should be greater than the "hurdle rate" in order for the project to be financially beneficial to the SAMPLE DISTRIBUTING CO. The formula for the 5 year MIRR is as follows:

$$Initial\,Cost = \frac{1}{(1+MIRR)^5} \left[FCF_1(1+s)^4 + FCF_2(1+s)^3 + FCF_3(1+s)^2 + FCF_4(1+s)^1 + FCF_5 \right]$$

The MIRR of the project equates to: 9.72%

Profitability Index (PI)

The Profitability Index represents the relative profitability of the project, or the present value per dollar of the initial cost. A project would be considered beneficial to the company if the PI is greater than 1.0. Additionally, the higher the PI, the more beneficial the project is for SAMPLE DISTRIBUTING CO. The formula for the 5 year PI is as follows

$$PI = \frac{\left[\dfrac{FCF_1}{(1+r)^1} + \dfrac{FCF_2}{(1+r)^2} + \dfrac{FCF_3}{(1+r)^3} + \dfrac{FCF_4}{(1+r)^4} + \dfrac{FCF_5}{(1+r)^5} \right]}{Initial\ Cost}$$

The PI of the project equates to: 1.24

Payback

The payback method was the first formal method used to evaluate capital budgeting projects. It is defined as the expected number of years required to recover the original investment. The basic idea is to start with the project's cost, determine the number of years prior to full recovery of the cost, and then determine the fraction of the next year that is required for full recovery. Typically companies that use the payback method have a predetermined "hurdle rate". For highly capitalized companies where the plant equipment provides a competitive advantage and is a significant barrier to enter or exit a market, the hurdle rate can be greater than five years. For companies that do not typically require a great deal of capital equipment for business sustainability, then the hurdle rate is normally three years or less. The formula for the payback is as follows

$$Payback = \frac{Initial\ Cost}{\left(Annual\ Labor\ Savings + Annual\ Other\ Savings + Annual\ Increase\ in\ Net\ Profits \right)}$$

The Payback of the project equates to: 3.33 Years

Discounted Payback

The discounted payback method is similar to the traditional payback method except that the expected cash flows are discounted by the project's cost of capital. Therefore, the discounted payback is defined as the number of years required to recover the investment from discounted net cash flows. The formula for the discounted payback is as follows:

$$Payback = Number\ of\ years\ prior\ to\ full\ recovery + \frac{Unrecovered\ cost\ at\ start\ of\ year}{Discounted\ cash\ flow\ during\ full\ recovery\ year}$$

The Discounted Payback of the project equates to: 3.07 Years

Financial Analysis Summary

Analysis Method	Result	Recommendation
Net Present Value	$295,337.11	Since Positive Number, **Recommend Project**
Internal Rate of Return	15.56%	Since Greater Than Cost of Capital, **Recommend Project**
Modified Internal Rate of Return	9.72%	Since Greater Than Cost of Capital, **Recommend Project**
Profitability Index	1.24	Since Greater Than 1, **Recommend Project**
Payback	3.33 Years	Since Greater Than 3 Years, **Do Not Recommend Project**
Discounted Payback	3.07 Years	Since Greater Than 3 Years, **Do Not Recommend Project**

Recommendation:

Since the financial analysis indicates that four of the six criteria correlate to project recommendation, then it is TriFactor's opinion based solely on the data provided by SAMPLE DISTRIBUTING CO. and these supporting calculations that this project **is recommended** for implementation.