# Business Mathematic

In the running of businesses, the managers are sometimes faced with situations where they have to evaluate a number of options for the best investment option that will help them achieve their business goals (Brooks, 2015). In our case, the Vinyl Fencing Company is faced with two investment options, either to save money using one of two annuity options for purchasing a new warehouse in five years to expand the business, or to save money using a sinking fund to replace a fence post molding machine in 3 years. In such a case, calculation have to be made to determine the best investment option that will be most profitable to the business.

For the annuity options, the two options available are either an ordinary annuity or annuity due. For the ordinary annuity, the payments are made at the end of the payment period, which in this case is 6 months. For the annuity due option, the payments are made at the start of the payment time.

 For the Ordinary annuity;

 $F.V= R\left[\frac{\left(1+ \frac{r\%}{2}\right)^{p\*2}-1}{\frac{r\%}{2}}\right]$ , where;

 F.V is the future value of the annuity.

 R is the amount payed per annuity

 r is the interest rate

 p is the periods of payment.

Hence:

 $F.V=3,100\left[\frac{\left(1+ \frac{4.8\%}{2}\right)^{10}-1}{\frac{4.8\%}{2}}\right]$

 F.V = $34,571.5357

Therefore, is the chosen investment option is the ordinary annuity, the raised amount by the end of the 5 year period will be $34,571.5357. The interest accumulated over this period will be 34,571 – 31000 = 4,571.

For the annuity due option,

 $F.V= R\left[\frac{\left(1+ \frac{r\%}{2}\right)^{2p+1}-1}{\frac{r\%}{2}}\right]$ , where;

 F.V is the future value of the annuity.

 R is the amount payed per annuity

 r is the interest rate

 p is the periods of payment.

Hence:

 $F.V=3,100\left[\frac{\left(1+ \frac{4.8\%}{2}\right)^{11}-1}{\frac{4.8\%}{2}}\right]$

F.V = $38,501.2523

If the business chooses to invest in annuity due option, the raised amount over the five year period will be 38,501.2523. The accumulated interest over this period of time will be 38,501.2523 – 31,000 = $8,501.

Comparing the two options, it can be seen that annuity due will raise more amount than the ordinary annuity. The annuity due is therefore the best option between the two choices as it earns more interest.

Now the business should evaluate the sinking fund option against the annuity due option to see which investment option is most suitable for the achievement of the business goals.

For the Sinking fund option, the calculations done will determine the amount paid per period so as to determine the interest that will have been earned from the investment.

For Sinking Fund:

$R=S\left[\frac{i}{\left(1+i\right)^{n}-1}\right]$, where;

 R is the amount payed per period

 S is final value

 i is rate of interest

 n is the number of years

Hence:

 $R=18,000\left[\frac{0.01125}{\left(1+0.01125\right)^{12}-1}\right]$

R = $1409.4365

If the business is to take the sinking fund option, it will save $1409.4365 in a period of 3 years. This will have accumulated an interest of 1,086.762.

18,000 - (1409.4365 \* 12) = 1086.762

Therefore, comparing the annuity due option and the sinking fund option, the annuity due option earns an interest of 8,501, while the sinking fund earns an interest of 1,086.762. However, if the business decides to expand the business instead of replacing the machine, the replacement of the machine will require the business to take a loan in order to fix the machine, and this may cost the business charges in terms of interest.

Based on the analysis above, I would recommend the business to go with the annuity due option, to expand the business and when need be, it can take a loan to fix the machine. According to Doroshenko et al, business loans are an important opportunity for growth hence should not be considered as a burden (Doroshenko et al., 2015). In our case, the business will get an opportunity to expand faster and this may in the long run cover any expenses that may have been accrued due to the decision.

References

Brooks, R. (2015). Financial management: core concepts. Pearson.

Doroshenko, Y. A., Somina, I. V., Komissarov, S. A., & Doroshenko, S. Y. (2015). The essence and characteristics of investment processes in small innovative enterprises. Asian Social Science, 11(6), 185.