ECONOMIC CALCULATIONS OF AN INVESTMENT OF A SLICING AND PACKAGING PRODUCTION LINE OF A MEAT PROCESSING FACTORY IN CSONGRÁD COUNTY

[1]B. Zsótér, [2]B. Kura

[1]University of Szeged Faculty of Engineering, 7 Mars square., 6724, Szeged, Hungary,
e-mail: zsoterb@mk.u-szeged.hu
[2]University of Szeged Faculty of Engineering, 7 Mars square., 6724, Szeged, Hungary,
e-mail: balintkura@citromail.hu

ABSTRACT

We test a Csongrád county meat-packing factory's new slicing-packing production line's investment. We value the different tenders from five main viewpoints, these are the following: the NPV (Net Present Value), IRR (Internal Rate of Return), DPB (Dynamic Payback), PI (Profitability Index), PB (Payback Time). During the calculation, we have experienced that both tenders would be viable financially. We recommended the offer of the GEA Group AG.

Keywords: investment, Net Present Value, Internal Rate of Return, Profitability Index, Dynamic Payback Period, Payback Period

1. INTRODUCTION

Investment refers to those complex material and technological steps which aim is to procure, set up new tangible assets, to replace, substitute overused tangible assets or to modernise, extend the capacity of already existing assets [1].

In accordance with Act C of 2000 Law on Accounting [2] the category of investment includes procution and setting up of tangible assets as well as their production by enterprises owned by the company; the commission of the procuted tangible assets, and operation carried out for the sake of intended operation before the commission as well as operation carried out before the intended operation. The extension of an already existing tangible asset, operation carried out with the aim of changing, transforming its intentional usage, increasing its lifetime and capacity also counts as investment. Furthermore, every operation in connection with the investment of a tangible asset, including planning, preparing, carrying out, loan application and insurance also counts as investment [1]. The aim of the economic calculation of an investment is to be able to compare investment companies in the phrase of decision foundation and be able to choose the one which is the most suitable for our purposes.

The aim of our research was to carry out the investment-economic calculations based on the two tenders previously requested by the client company. It involves the calculation of net present value, internal rate of return, profitability index, payback time and discounted payback time, on the basis of which we were able to find the most economic choice for the company from financial point of view and we suggested the management to carry out the investment in accordance with this. The aim of the investment was the slicing-packaging process line.

2. THE MOST IMPORTANT INFORMTION REGARDING THE INVESTMENT

In order to realise our aim four dynamic as well as a static investment-economic calculation were carried out. Before introducing the formulas in connection with them a few basic terms is described in connection with the topic.

In case of most companies the most important decisions within the scope of long-term investments are in connection with decisions about investments. Creation investment decisions is regarded the most important field of corporate finances. Since the majority of investments means a one-time expense, their realisation takes a long time and the income generated by the investments appears later and their appearance is

uncertain investments influence the technical and technological features and economical- financial situation of the company on the long run [3].

The investments were realised in several different tangible assets; with the procurement and setting up of those the company aims to realise a previously concretized goal. These goals among others can be the increase of the profit and market share of the company, the reduction of the costs of the company, replacement of the old and worn out assets as well as meeting the regulatory requirements and laws [3].

When assessing the investment proposals the analysts have made a decision about that in case of the realisation of the investment it will increase the market value and the owner's assets or not. Naturally, only those assets increase the asset of the company which worth more than their cost thus their operation will result in more income than its investment cost [4].

The financial assessment of the proposals is a special field of business analysis since it is not the subsequent examination of revenues, costs and incomens that is being carried out, but it is executed regarding the future [3].

For the assessment of the projects it is advasible to estimate factors such as the usable life-expectancy of the investment, money-flow in connection with the investment and intest rate necessary for the discounting of the cash flow [3].

The useful life of the investment lasts from the date of the installation to the decommissioning due to legal, technical or economical reasons. Since income generated via the project is greatly influenced by the useful life, the analyst has to focus on finding out what is the optimal usage time of the equipment [3].

The evaluation of investments is a much more complicated task than the evaluation of the financial assets. Estimating cash flow is only a part of the tasks of the analyst. Information is required for the estimation. The company can acquire these pieces of information from different professionals who are quite familiar with the technical features of the project. After this the decisionmakers decide if the project is worth implementing. [3].

Another reason why estimating the cash flow of investments is a complicated task is because of the fact that there are only a few so-called greenfield investments- in case of which it is the easiest to assign cash flow. Most of the cases investments are realised by companies which are in operation for a long time, where the equipments produce the income together. In this case it is impossible to calculate the contribution of an asset to the future income [3].

When an investment proposal is examined from a financaial point of view what is being considered is whether during the operation there will be enough income generated during the useful life to result in the expansion of the company. Thus the relevant cash flow in connection with the investment will be the operational cash flow [3].

For the real value of the projects it is necessary to know which incomes and costs can be considered for calculations when estimating cash flow [3].

The following rules should be considered when estimation cash flow.

First, cash flow should be estimated on growth-basis. In other words, every cash flow which in case of approval of the project could result in change in the revenue, costs or in the taxes payable, should be inserted into the analysis. This is the only regulation which guarantees that each and every investment is judged by its own values [5].

The cash flow should be measured on the after tax base. For taxes actual pay out is carred out thus, if a decision-maker maximises the value, he calculates with the after tax profit. On the other hand, it realisation of the investment itself is carred out from the after tax money. Bearing all this in mind, it becomes clear that it is possible to remain consequent only if cash flow is calculated with the net value [5].

The indirect effects of the project should also be taken into consideration. It is in connection with the estimation of the cash flow on a growth basis. Projects could have favourable and unfavourable effects. Most of the cases it is possible in case of a new product because it is possible that because of the new product the volume of the old one decreases. The above mentioned effect is called erosion. In this case the estimated revenue of the new product has to be modified to compensate for the loss generated by the devaluation of the old product [1].

The sunk costs should not be taken into consideration. These costs are generated previously or expenses which are in connection with the project however their return does not depend on the realisation of the project. Only those basic costs should be taken into considerton which were paid after the realisation of the investment [1].

The alternative costs of the already existing resources used for the investments should also be taken into consideration. The alternative cost of the capital is not in connection with the acquisition of an equipment but it is waiving of a benefit. The alternative cost of an already existing asset is a cash flow which is generated by the asset in case of an unplanned investment [3].

The net working capital (working capital need) should also be taken into consideration. The difference between the current assets (inventory and receivables) and the short term liabilities (vendors) gives net working capital need. The nature of the net working capital it that by the end of the investment the the working capital releases and it can be utilised in other areas [1].

When estimating the cash flows cash flows in connection with financing should not be taken into consideration. This is due to the fact that it is the money income generated by the new equipment. In order to do so cash flow deriving from the operation of the equipment should be compared to the cash flow utilized for its acquisition [1].

The final part is the the consistent treatment of inflation. Distinction should be made between nominal and real interest rate. If nominal interest rate used as a discount rate than cash flow should also be estimated nominally, however, in case of using real interest rate, prices should not be changed. Using nominal interest rate is typical, what makes it difficult is that it is not necessary adavisble to use the same rate for all the cash flow since in this case cash flows changes in the same way [5].

There are three types of cash flow: initial, operational and final cash flow [3].

Intial cash flow means the total expenses during the investments. From the beginning of the invesvestment (the decision) to the commissioning. In order to calculate the initial cash flow it is adavasible to rely on the financial regulation on cost of the assets which gives the book value of the assets [3].

The initial cash flow consists of the following:

+ The purchase value of the asset/assets
+ Net working capital need
+ Capitalisable costs
+ Alternative cost of already existing resources
- Incomes deriving from the sales of old asset/assets [6].

When estimating the operational cash flow the changes in the income and costs of the company caused by the investment during the useful life is calculated [3].

The operationa cash flow of any period can be calculated in the following way:

+Revenue
- Current operating expenses
- Depriciation
Earning before interest and taxes (EBIT)
- Corporate tax
After tax revenue
+ Depreiciation
± Changes in net working capital
Net operational cash flow of the period [6].

The estimation of the final cash flow gives the amount which could be gained back after the operation of the investment from the originally invested amount. It has two main parts: the actual income from the sales of tangible assets and the released working capital [3].

Grouping project based on which life stage of the asset do they belong to is only one possibility. The other way is to group them according to how much change is possible in the sign of the cash flow during the useful life. Thus we can differentiate conventional and unconventional cash flows [3].

It is typical for the conventional cash flow to have only one negative sign cash flow during the useful life of the investment. This is the initial capital cost in connection with the instalment. The operational cash flow is expected to have positive sign [6].

It is typical of the unnconventional cash flow to have a negative sign besides this, among the operational cash flow on can find negative and positive signs as well [3].

When evaluating investments there are two types of problems that financial anaysts have to face. One of them is whether it is worth implementing the investment or not. The other one is that from the two mutually exclusive projects which is the most suitable for the company [3].

Most of the companies have to face the first problem thus each and every offer should be analysed in connection with its financial viability [3].

The second problem arises when the company realises its goals vie two totally different projects. In this case financial viability of the investment should also be analysed and the most suitable should be chosen. There are several simple and more complicated calculations to help solve problems in connection with investments. Whichever method is chosen the following assumptions should be regarded as valid. Money in and outflow typically occurs towards the end of the year. Commissioning happens after the acquisition. Finally, the risk of future cash flow is equal [3].

Among the different calculations return time, discounted return time, net present value, internal rate of return and profitability index bear special importance.

2.1. Material and method

The two groups of calculations preceeding investments are called static and dynamic calculations [7].

In case of static calculations the capital value of money is not taken into account. Thus from the point of view of the decision makers the amount of cash flow generated during the useful life and their time of generation is not important. That is why nowadays these methods are not used any more. They are only concerned to be supplementary methods form dynamic calculations. The most well know statical index is the return time [7].

In case of dynamic method the time value of money is taken into consideration. Dynamic calculations are called calculations based on present value or techniques based on discounted cash flow. Calculating net present value (NPV), internal rate of return (IIR), profitability index (PI) and discounted payback belongs here [7].

Net present value is the most useful indicator when evaluationg investments [3].

It is calculated in the following way:

$$NPV = -C_0 + \sum_{t=1}^{n} \frac{C_t}{(1 + r)^t} = -C_0 + PV \tag{1}$$

Net present value (1) is a difference-type indicator which indicates the amount of net income growth by extracting initial capital investment from the discounted cash flow generated during the lifespan of the investment. C_0 in the formula indicates initial cash flow, C_t operational cash flow in every year, r indicates interest rate, t refers to useful life. PV is the total present value of operational cash flows, in other words net income, which means the income generating potential of the investment [3].

Table 1. Decision criteria of net present value(Source: [8])

If	Meaning	Decision
NPV>0	The investmentis expected to increase the value of the company	Project should be accepted
NPV<0	The investment is expected to decrease the value of the company	Project should be declined
NPV=0	The value of the company is not expected to change because of the investment	Accepting or declining the project is neutral

Table 1 shows that project should be accepted in the case when net present value is bigger rhan or equal to zero because the value of the company will increase due to the investment or it will not change.

Net resent value has several strong and weak points as well. Among its strong points are that it takes into consideration the canges in the amount of cash flow during the time of investment. It only depends on the cash flow resulting from the projects and income level generated by the investments [2].

Its weak point is that it gives the income in absolute amount. Thus hiding the time in which the invested capital resulted in the income growth. Another fault is that instors calculate with percentages thus net present value in absolute amount is not the best way of inllustration [2].

Internal return rate shows the general return rate during the useful life [9].

$$-C_0 + \sum_{t=1}^{n} \frac{C_t}{(1 + IRR)^t} = 0 \tag{2}$$

In the formula (2) r indicates the expected yield t the useful life. C_0 indicates the initial cash flow, C_t the operational cash flow in every year [7].

IRR is a unique profitability indicator. In case of using this indicatior for evaluating investments, the rule is that internal return rate should be compared to expected yield [9].

Table 2. Decisional criteria of internal rate of return (Source: [8])

If	Meaning	Decision
IRR>r	The expected yield of the investment is bigger than the expected yield	The investment is acceptable +NPV
IRR<r	The expectd yield of the investment is smaller than the expected yield	The investment should be declined - NPV
IRR=r	The expected yield of the investment equals the expected yield	It is neutral to accept or decline the project NPV=0

Table 2 indicates that the investment is acceptable if the internal rate of return is bigger or equals the expected yield.
Its adavantages are that it takes into account the total cash flow and their changes in time during the whole lifespan of the investment. In normal decision making it is easy to interpret because it equals the net present value [7].
Profitability index is a simplified version of net present value. The difference between the two calculations is that profvaitability index takes the proportion of cash flow instead of difference between the present value of cash flows generated during the time of the investment and the initial capital investment [9].

$$PI = \frac{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}}{C_0} \tag{3}$$

The other name of profitability index is yield-cost ratio because yield from the investment is compared to the costs of the project (3).

Table 3. Decision criteria of profitability index(Source: [8])

If	Meaning	Decision
PI>1	Every invested HUF1 is expected to result in more than HUF1 return in present value	The project should be accepted
PI<1	Every invested HUF1 is expected to result in less than HUF1 return in present value	The project should not be accepted
PI=1	Every invested HUF1 is expected to result in exactly HUF1 return in present value	It is neutral to accept or decline the project

It is clear from Table 1 that profitability index is ideal in case if its value is bigger than 1 or equals 1 because in these cases with every invested HUF 1 the return is expected to be exactly HUF 1 in present value or more than HUF 1.
The advantage of profitability index is that it is easy to calculate and in case of resurce limit in can result in better decision than net value [9].

When ranking mutally exclusive projects and projects of different scale there is an opposite result to net present value thus it is difficult to interpret. It is considered its weakness [9].

Return time is the most well known static method which is not based on discounting. It indicates the number of years necessary for the operational cash flow to return the invested money [7].

The return time is the quotient of the initial capital investment and the expected yearly cash flow if we assume that cash flow generated during the operation of the asset is of the same in proportion in every year [7].

$$\text{Return time} = \frac{\text{Initial investment}}{\text{Expected net yearly cash flow}} \tag{4}$$

The return time (4) has several advantages and disadvantages as well. Among the advantages it can be mentioned that it is easy to calculate and interpret. Moreover, in case of especially risky future it provides information about the risk. It prefers viability since the shorter the return time the sooner the incoming cash flow can be utilized.

One of the biggest disadvantages is that it does not take into consideration the time value of money. Furthermore, during the average, the investment where profit is constantly rising is regarded as profitable as the one where profit occurs in the beginning of the period. It calculates by accounting profit, which can be manipulated to a certain level.

The last indicator is the discounted return time (5) which is a dynamic calculating method. It is developed version of return time. This decision making rule tries to merge the advantages of return time (indicating risk and liquidity) and dynamic methods. It expresses for how many years the investment should operate in order to be able to interpret it from the point of view of net present value. In other words, how many years of discounted profit is necessary for the return of the originally invested capital. It takes into account the time value of money but it does not calculate with the profits generated after the return time. Similarly to the simple return time, this method reflects the subjective criterias of the management [3].

It can be calculated in the following way

$$\text{PVIFA}_{(r\%,n\,year)} = \frac{\text{Innitial investment}}{\text{Expected yearly cash flow}} \tag{5}$$

Here r is the expected yield by the owners. The useful life of the investment is indicated by n. The quotient of the initial investment and the expected net yearly cash flow can be find in the table showing the present value of annuity and that value gives the discounted return time. This value is supposed to be less in case of the useful life [3].

3. EVALUATION OF THE RESULTS

The client company asked our professional opinion about its lates planned investment. The company we examined planned to replace a slicing and packaging machine which had been in use for a long time. To replace the above mentioned production line several quotations were asked from different companies. Two quotations arrived, one from GEA Group AG and the other from Multivac Hungaria Kft. The company provided us with all the necessary information including the purchase price of each quotations (GEA Group AG: HUF 249 187 200, Multivac Hungária Kft.: HUF 255 875 600). The useful life of the production lines (5 years), the expected yield by the owners (10%), the corporate tax for 2016 (19%) and the expected costs and revenues necessary for the operational cash flow. With this information first the depreciation was calculated for both quotations. Then the operational cash flow of the two processing lines were calculated. Net present value, internal return rate, discounted return time and profitability index were calculate for both quotations as presented in the literature. A static calculation method was used, namely the return time.

After the calculations the followind indicators were given.

Table 4. Comparison of quotations for the slicing and packaging production line (Source: own results)

Indicator	GEA Group AG	Multivac Hungária Kft.
Net present value (NPV)(HUF)	**33.979.255**	27.988.109
Internal return rage (IRR) (%)	**15,20**	14,20
Profitability index (PI)	**1,14**	1,11
Discounted return rate (year)	4,7	**4,6**
Return rate (year)	**3,34**	3,42

As it can been seen in Table 4 both quotations are favourable regarding every indicator for the company however, the offer of GEA Group AG is favourable. (With the exception of the discounted return rate in case of every indicators). The net present value is the highest in this case: HUF 33 979 255, which is bigger than 0, thus it meet this requirement. The internal interest rate is 15.20% which is bigger than the expected yield (10%). Profitability index is 1.14 which means that after every invested HUF 1 HUF1.14 is generated. Based the above mentioned we suggest the acception of the first offer. Thus we also suggest that the meat processing factory in Csongrád county should realise the project offered by GEA Group AG.

4. CONCLUSIONS

The meat processing factory in Csongrád county planned to replace a slicing and packaging production line which was in usage for a long time. Investment economy calculation were carried, based on which we made suggestion about that from the mutually exclusive offers which would be the most economical to realise. In order to do so we made four dynamic and a static investment economy calculations. The quotations proved to be viable for the meat processing factory of Csongrád county. Based on the indictors we suggest that the offer of GEA Group AG should be accepted since the return time of this is the shortest and the net present value is the highest, the internal interest rate and profitability index is the best.

The acquisition of the processing line was carried out in 2016 but the meat processing factory accepted the economically less favourable offer of Multivac Hungária Kft. The company admitted that based on the indicators the quuotation of GEA Group AG is favourable. The decision was explained by that the company has a long lasting business relationship with Multivac Hungária Kft which means security for them.

REFERENCES

[1] I. Illés, L. Gyulai, L. Lauf, A vállalkozásfinanszírozás alapjai, SALDO Pénzügyi Tanácsadó és Informatikai Zrt., Budapest, 2013.

[2] A számvitelről szóló 2000. évi C. törvény.

[3] Iné. Illés, Vállalkozások pénzügyi alapjai, SALDO Pénzügyi Tanácsadó és Informatikai Zrt., Budapest, 2009.

[4] A. Rappaport, Creating Shareholder Value – A Guide for Managers and Investors, 1998; In: Kiss N., A tulajdonosi érték – Útmutató vállalatvezetőknek és befektetőknek, Alinea Kiadó, Budapest, 2002.

[5] R. Brealey, S. Myers, Modern vállalati pénzügyek, Panem Kiadó, Budapest, 2005.

[6] É. Pálinkó, M. Szabó, Vállalati pénzügyek, Typolex, Budapest, 2008.

[7] Iné. Illés , Társaságok pénzügyei. SALDO Pénzügyi Tanácsadó és Informatikai Zrt., Budapest, 2002.

[8] B. Zsótér, M. Molnár, J. Gál, Economic calculations related to the purchase of packaging machines in a poultry processing plant, ANALELE UNIVERSITÁTII DIN ORADEA FASCICULA PROTECTIA MEDIULUI, Nagyvárad, 2015.

[9] D. R. Harrington, Corporate financial analysis: Decisionsin a Global Environment, 1993, In: Nagy László, Fehér Zsuzsanna, Vállalati pénzügyek elemzése, Kossuth könyvkiadó, 1995.