Capital investments in the context of time factor

Investiţiile de capital în contextul factorului timp

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Abstract

The market economy creates various variants that an investor or another should know very well, should analyze them and choose the variant of investment which is the closes to its purposes. Such a variant of investments is the one that may materialize in certain manufacturing capacities, case in which the gain of the investor turns into profit; on this plan, we may assert that gaining much profit is the final purpose pursued by any investor in such a variant of capital placement. On the other side, we also must emphasize that profit is earned in time, and the time factor, on its turn, should be known, analyzed, localized and, certainly, quantified, so that the investment decision should not be empirical, but substantiated. This paper proposes to focus on few of the most important aspects of the impact of time factor on the capital investments, generally, and on their economic efficiency, particularly.

Keywords: *profit, final profit, efficient period, functioning period, recovery period*

Rezumat

Economia de piaţă creează variante dintre cele mai diverse pe care un investitor sau altul trebuie să le cunoască cu temeinicie, să le analizeze şi să se îndrepte cu decizia de investiţie către varianta care este cea mai apropiată scopurilor sale. O asemenea variantă de investiţii este şi aceea care se poate concretiza în anumite capacităţi de producţie, caz în care câştigul investitorului îmbracă forma profitului; pe acest plan, putem afirma că obţinerea de cât mai mult profit este scopul final urmărit de orice investitor într-o asemenea variantă de plasament al capitalului. Pe de altă parte, nu trebuie scăpat din vedere că profitul se obţine în timp, iar factorul timp, la rândul său, trebuie cunoscut, analizat, localizat şi bineînţeles cuantificat, astfel încât decizia de investiţii să nu fie una empirică, ci una fundamentată din punct de vedere. Articolul, aşadar, îşi propune să scoată în evidenţă câteva dintre aspectele mai importante ale impactului factorului timp asupra investiţiilor de capital, în general, asupra eficienţei economice a acestora, în special.

Cuvinte-cheie: *profit, profit final, perioada eficientă, perioada de funcţionare, perioada de recuperare*

JEL Classification: G11, G31

Introduction

Any investor is preoccupied with a more convenient fructification of the capital held. Otherwise said, the efficiency of the capital investments is the guiding line of any capital placement; on the other side, we must mention the fact that in a free market economy, capital investments have various forms, from investments in real estates, in tangible productive assets, to the investments in negotiable instruments on the capital market, or in leasing operations (Botezatu, 2009).

Obviously, in each of the respective cases of placements, incomes or, better say, gains, have various forms, such as profits, dividends, interests etc. We must also mention the fact that no matter the form of investment, the time factor is very important and has impact on the gains and influences the profit in a direct way.

From among the possible variants of capital placement, we shall discuss in this paper about the problems put by the capital investments in manufacturing capacities, which has as obvious purpose earning profit. On the other side, the problems that such a capital investment puts will not be analyzed at the general level, but at a particular level, through the prism of time factor.

Impact of time factor on the period of achieving an investment

As regards a capital investment, we face more stages where time factor is felt, influencing directly, as mentioned before, the final gains brought by the respective capital placement. Below we shall try to refer briefly at a few more important stages of an investment project, where time factor is present (Ionita et al., 1993; Stoian, 2004; Vasilescu et al., 2000).

Talking about investments in manufacturing capacities, a first stage is the one aiming at the design of the future manufacturing capacity. Obviously, the respective activity lasts for a certain period of time.

In this context, either we talk about a car factory, or a ready-made clothing factory, or a shoe factory, the main issue refers at shortening the period of time required by that activity. One of the reasons pleading for this thing is that if the designing activity mentioned above lasted very long, it would be possible for the respective manufacturing facility to become obsolete, the products would be manufactured, but not sold. This is not wanted to happen, because, in such cases, the efficiency of the respective investment would be influenced negatively, reaching not only at the decrease of profits expected, but, sometimes, even to significant losses. That is why the respective designing activity must be dimensioned at the minimum necessary, from the time point of view.

Going along the logical stream of the investment's stages, the next one would be related to achieving the respective investment. Achieving the respective investment or, better say, the period for achieving such an investment is one of the important stages of an investment process where time factor is a lot felt.

Generally, we might say that, the shorter the reminded period is, the more positively influenced the economic efficiency of the respective investment is.

There appear a lot of problems as regards the time used to achieve such an investment, two of them being the most important, in my opinion: effective period of achieving the investment and manner of evaluation of the investment expenses per year (Sharpe & Gordon & Bailey, 1999; Vasilescu et al., 2004).

In this regard, we consider the example from Table 1, as being useful: we presume that, for building a TV set factory, in value of 1,400 mil. RON, during a 4-year period, we have to make a choice from among three variants of distributing the investment expenses.

Distribution of investment expenses (mil. RON)

Table 1

Years // Variants	1st year	2nd year	3rd year	4th year	Total
V1	200	300	400	500	1,400
V2	350	350	350	350	1,400
V3	500	400	300	200	1,400

In the above context, one of the problems to be clarified refers at the direction where the distribution of the investment expenses goes, within the 4-year period of making the investment. In other words, we face a problem of choice; we have to choose among the 3 variants of distributing the investment expenses in the context where the value of the investment is the same, does not differ from a variant to another and the period of achieving such an investment is the same, a 4-year period.

In order to give an answer at such a problem, we shall use an indicator, relatively simple, used in substantiating the efficiency of capital investments, respectively the "yearly average value of the capital investment":

$$M = \frac{\sum_{h=1}^{d} I_n (d - h + 1)}{d},$$

Where:

M = yearly average value of the capital investment
I_n = investment expenses made per year of the investment period
d = period of achieving the investment

Calculating the indicator mentioned above per each of the three variants of investments, the situation is the following:

$$M_1 = \frac{200(4-1+1)+300(4-2+1)+400(4-3+1)+500(4-4+1)}{4} = 750mil$$

$$M_2 = \frac{350(4-1+1)+350(4-2+1)+350(4-3+1)+350(4-4+1)}{4} = 875mil$$

$$M_3 = \frac{500(4-1+1)+400(4-2+1)+300(4-3+1)+200(4-4+1)}{4} = 1000mil$$

Therefore:

M_1 = 750 mil; M_2 = 875 mil; M_3 = 1000 mil

This indicator shows how much from the respective capital remains invested, in average, per year.

In order to offer a clearer image of the capital expenses in the context of time factor, next to this indicator, it is better to calculate another indicator, respectively "effect of capital investment", as follows:

$$I_t = aMd ,$$

Where:

I_t = effect of capital investment
a = coefficient of economic efficiency
M = yearly average value of the capital investment
d = period of achieving the investment

In our case, we shall obtain for each variant:

$$I_{t1} = aM_1d = 0.15*750*4 = 450mil$$

$$I_{t2} = aM_2d = 0.15*875*4 = 525mil$$

$$I_{t3} = aM_3d = 0.15*1000*4 = 600mil$$

The indicator I_t = effect of capital investment, is an indicator that should be taken into consideration by each investor, for a correct and relevant calculation, for substantiating the investment decision in the context of time factor.

This is also required as much as, as value is concerned, the respective indicator is found within the total invested value; in other words, once the value of

the respective indicator increases, the value of the investment increases. As the value of the invested capital increases with the reminded value, obviously the period of recovery of the invested capital increases and, therefore, other indicators of economic efficiency will be influenced, which refer at the volume of the invested capital.

In fact, as mentioned above, any capital placement aims at obtaining a certain gain. For example, a capital placement in a bank deposit leads to a gain for the investor, in form of interest. The same investor may change his direction and may invest its capital in a manufacturing capacity, as the one mentioned above, a TV set factory. In this case, the gain of the investor will be in form of profit.

However, in case of a bank deposit, the gain will appear one year later, and will be of 15% higher then the capital invested, and in case of the investment mentioned above, the same capital will stay for 4 years, during the period of achieving the investment and will produce profit, if it is a good investment, only after the facility is over, 4 years later. During these 4 years, the respective investor could have obtained gains from interests (15%) each year; in case of the respective investment, due to its specificity, the respective investment stays immobilized and does not produce anything. Under these conditions, the economic effect that could have been obtained in case of a bank deposit in 4 years must be considered as expense. If things are different, the value of the capital investment must include also this expense, which, obviously, will also modify the value of other indicators of economic efficiency of the investments, in which context can be found the volume of the invested capital.

On the other side, "the period of recovery of the invested capital", as relevant indicator, used in substantiating the investment decision will reflect not only the recovery of the respective investment, but also the effect of immobilizing the invested capital, value that in fact increases, eventually, the effort of capital.

In another context, to improve the influence of the time factor, where it is possible, it is indicated to commission some partial manufacturing capacities.

For example, if we are in a situation of building a car factory, where the total period of achieving the investment would be of 4 years, it is possible for the main attention to be focused on a manufacturing department, the one of spare parts, which should be finalized earlier, in 3-year's time, the other investments lasting for another year, until the expiry of the 4-year period. Practically, such a manner of approaching the achievement of the investment has direct impact on the gains, on the profit, particularly, and on the economic efficiency of the investment, generally.

In other words, if the period of achieving the investment is of 4 years, and, 3 years later certain manufacturing capacities may function, they would generate a certain profit; this means in fact that in the 4^{th} year of the investment, we shall record two different activities. On one side, we shall have a manufacturing activity started from the partial manufacturing capacities already commissioned (such as, manufacturing spare parts) and, on the other side, we shall have an investment activity on the other objects of the investment that have not been finalized yet.

The efficiency of such a manner of thinking, for distributing investments in time, consists in the fact that investments from the 4th year, for the example above, would decrease with the profit brought by the manufacturing capacities commissioned partially at the end of the 3rd year.

Finally, the idea is that the effort of the invested capital for the achievement of the respective objectives will be decreased with the profits obtained per manufacturing capacity partially commissioned.

Schematically, the reasoning of commissioning partially some manufacturing capacities is presented in Figure 1.

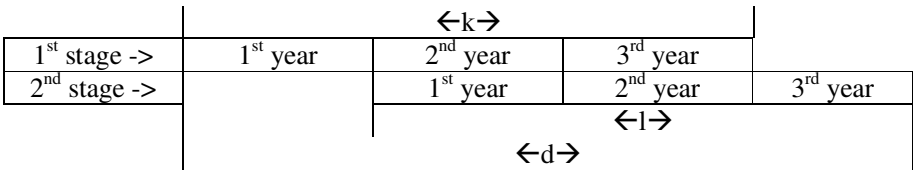

Figure 1. Schema of manufacturing capacity partially commissioned

In Figure 1, we notice a period of making the respective investment of 4 years, but approached from a new thinking of evaluating the investment expenses, and of the respective works, so that, within the achievement period, we might commission some partial manufacturing capacities. Thus, in the 1st stage, the investment works for the spare part department have priority, department that will be finalized in 3 years, when it will start making profit. One year after the first stage begins, the 2nd stage will begin, of investments in the works for the other objectives. The diagram shows that during 2 consecutive years, the two stages overlap, so that both stages will be achieved within those four years of making the investment. The central point of this manner of investment evaluation is given by the fact that, in the 4th year of the investment, profit is earned, which leads to the decrease of the invested capital, with the volume of the profit earned in this year.

The problem of creating such a manner of building the investment in time also has impact on some indicators, such as those two already mentioned, "yearly average value of the capital investment" and "effect of immobilization of invested capital".

In case of commissioning some manufacturing capacities, the yearly average value of the capital immobilization will be calculated per each stage separately, and also at the level of the whole period of making the respective investment. In other words, in case of the example mentioned above, the indicator will be calculated as follows:

- for the 1st stage:

$$M_1 = \frac{\sum_{h=1}^{k} I_n (k-h+1)}{k}$$

where:

M_1 = yearly average value of the immobilization of the invested capital in the 1st stage
I_n = investment shared per years, in the 1st stage
k = period of achieving the investment, in the 1st stage

The result obtained subsequent to this calculation formula will reflect the yearly average value of the capital immobilization, but at the level of the 1st stage of the investment, as explained before.

Similarly, we shall calculate this indicator for the 2nd stage:

$$M_2 = \frac{\sum_{h=1}^{l} I_n (k-h+1)}{l},$$

where:

M_2 = yearly average value of the immobilization of the invested capital in the 2nd stage
I_n = investment shared per years, in the 2nd stage
l = period of achieving the investment, in the 2nd stage

Once calculated, the respective indicator during the 2 stages mentioned above, we may pass to the calculation of the indicator at the level of the whole period of achieving the investment (of 4 years), as follows:

$$M = \frac{M_1 k + M_2 l}{d},$$

where:

M = yearly average value of the immobilization of the invested capital in the whole period
d = total period of achieving the investment

Similarly, we may calculate the effect of capital immobilization at the level of each stage and at the level of the total period of achieving the investment.

The relations of calculating the "effect of immobilization of the invested capital" are the following:

- for the 1st stage:

$$I_{t1} = aM_1 d$$

- for the 2nd stage:

$$I_{t2} = aM_2d$$

- for the whole period of achieving the investment:

$$I_t = aMd$$

In the above relations, the signification of the symbols is presented above.

The calculus of the mentioned indicators, within which we can find the influence of the time factor, is very important because on the accuracy of this calculus depends the correct substantiation of the investment decision (Haim, L. & Marshall, S. 1986; Lumby, 1995; Romanu & Vasilescu, 1997).

To ignore the yearly average value of the capital immobilization and the effect of immobilization of the invested capital means not to quantify correctly the investment effort, and this means to make a wrong decision of investments with all the negative implications such a decision may presume.

Impact of the time factor after starting and investment

We shall try and analyze further the impact of the time factor in a different period, the one after starting the investment objective. For this, we shall use a simple scheme of the investment process (Figure 2).

The respective scheme has the following reasoning as basis: first, there is a period of achieving the investment ("d"), period during which some implications of the time factor were specified before. After the expiry of this period of time, the investment objective is commissioned and follows another period, of its functioning ("De"), period when it is presumed that the respective investment will bring profit. Profit, on the scheme, appears as difference between the turnover and the manufacturing cost at the level of each year, during the efficient period of functioning of the respective investment.

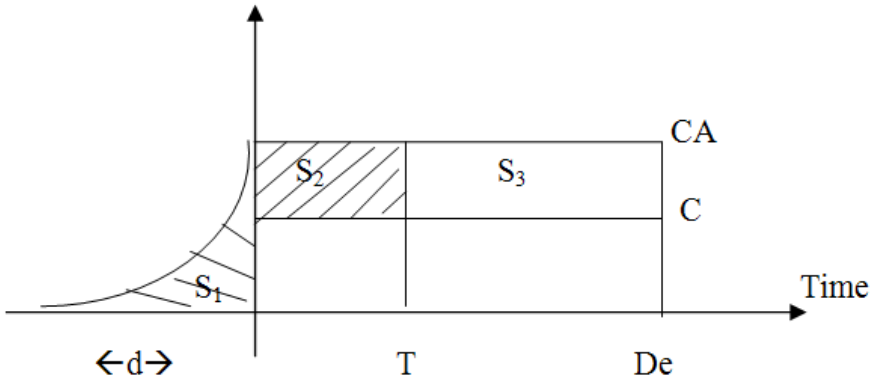

Figure 2. Scheme of the investment process

In this regard, the turnover ("CA") from the above scheme is symbolized in form of a parallel with the abscissa and the manufacturing cost ("C") is represented similarly, in form of a parallel with the abscissa. In such a scheme, in order to better understand the particularities of the investment process related to the time factor, it is deemed that both the turnover and the manufacturing cost are constant, on an efficient functioning period; in other words, during the period of time mentioned, both the turnover and the manufacturing cost were considered in form of an yearly average. The surface S1 represents the value of the invested capital, whereas the surface S2 represents a certain quantity of profit earned after commissioning the respective investment, such a quantity of profit to be equal to the invested capital. In other words, the surface S1 is equal to the surface S2, or the profit cumulated on time, earned after commissioning the investment, is equal to the invested capital. Such a moment in time, when cumulated profit earned after commissioning the investment, is equal to the invested capital is the term of recovery of the invested capital.

It is obvious that, from the point of view of time factor, any investor is interested that its investment to be recovered in a shortest time possible, or, the term of recovery of its investment, as indicator, to be the shortest possible, under certain conditions.

Finally, surface S3 means the quantity of final profit. According to the above scheme, is the share of the total profit brought by an investment during its functioning period, minus invested capital. In the same context, it is not wrong if we call this area of the final profit (surface S3) the profit earned after the recovery of the invested profit.

Certainly, an investor is interested in a higher yearly profit and in a highest possible total profit, earned during the whole period of the investment's

functioning. In the same context, we have to mention the fact that the investor is most interested in the final profit, specified above, which, in fact, represents its final purpose. That is why it is not wrong if we say that, in our opinion, all the problems are eventually around the surface S3, respectively the final profit.

Another question is raised, respectively what would be the main ways of increasing the final profit, representing Surface S3?

In fact, the main ways of increasing the final profit are those that can be seen in the respective diagram, regarding the increasing of the surface S3. Otherwise said, as one can easily notice, a first way in the meaning of those shown above, is to decrease the term of investment's recovery; if the vertical right marking the recovery term moves to the left, to the origin, the surface S3, respectively the final profit, will increase, in the conditions of a certain given period of investment's functioning. This is an extra reason for any investor to take all measures to be able to recover its investment in a shorter period of time.

Another manner of increasing the final profit, where time factor is felt, is the one of extending the efficient period of investment's functioning.

We see again, on the Figure 2, that any movement to the right, on the time scale, of the efficient period of investment's functioning means in fact an increase of the surface S3, so of the final profit. Under the impact of the time factor, a criterion of economic efficiency of the capital investments may be formulated as follows: an investment is more efficient as the period of time is maximized between T and De, meaning that the maximization of the period of time elapsing after the recovery of the investment and until the expiry of the efficient period of investment's functioning.

In fact, the maximization of the expression:

$$E = De - T,$$

where:

De = efficient period of investment's functioning.

T = term for recovery of the invested capital

Does not represent a purpose per sei, the interest for the period of time mentioned to be the highest is related to this period, mainly if, during this period of time, the final profit is earned; anyhow, the final profit represents one of the final purposes of any investor, so, it is natural fro the period of time to be in its attention.

Beside the manners presented above to increase the final profit, respectively the decrease of the term of recovery of the investment and the extension of the efficient period of investment's functioning, we may also add at least two ways: increase of the turnover and decrease of the manufacturing costs.

Whereas, it is well-known the fact that work productivity, due to the technical progress, has an increasing tendency, it is obvious that this will lead, in time, at the increase of the turnover, which will generally mean a higher profit brought by the respective investment, thus a higher final profit, as mentioned above.

A similar thing happens to the manufacturing costs in time. The technical progress, through the new technologies appeared in time, would lead to the decrease of the manufacturing costs, which means in fact a proper increase of the profit, generally, of final profit, particularly. Therefore, after the achievement of the investment, meaning after its commissioning, the time factor has impact on the economic efficiency of the capital investments, as mentioned above.

In a different direction, the impact of the time factor on the period of investment's functioning is specific. Both in the substantiation of the economic efficiency of some capital investments, we talk about an indicators, called "functioning period of an investment".

Speaking about this period, where time factor is felt a lot, we distinguish two nuances: the period itself, the physical period of functioning and the efficient functioning period of the same investment. There are differences between these two notions, which should be known by any investor.

Thus, whereas the efficient functioning period of the investment represents a certain period of time when the respective investment has the capacity to produce profit, the physical period of functioning, which may differ from the efficient functioning period represents a period of time when the objective may function technically.

In other words, a vehicle, purchased 20 years ago, technically it may function even today, but, economically, things are different. Being worn, the vehicle will need a lot of spare parts and the engine will consume oil, in addition to the gasoline. Engine oil is more expensive per liter than gasoline. Under these conditions, the following question is put: is the vehicle worth being kept in function, under these conditions?

Similarly, the problem is put in case of a manufacturing capacity resulted subsequent to a capital investment: technically, the respective investment may also function, but in conditions of losses.

Practically, during the time interval Δt, losses will appear.

$$\Delta t = Df - De,$$

where:

Δt = time interval where losses are recorded
Df = physical period of investment's functioning
Dc = efficient functioning of investment's functioning

That is why, within the substantiation of the economic efficiency of the investments, any investor must pay attention to the efficient functioning period of the respective investment, to that period of time when the respective capital investment has the capacity to bring profit. Beyond this period of time, the respective investment not only does not produce profit, but will also bring losses, mainly due to the exploitation costs that will be increasing.

We must also emphasize the fact that the efficient period of the investment's functioning is a decisive factor of increasing the final profit, being in direct relation with this.

Some conclusions regarding the capital investments in the context of time factor

Out of the brief presentation of some effects of the time factor on the capital investments, a very clear conclusion may be put: the process of substantiation of the economic efficiency of the capital investments cannot take place outside the consideration of the influence of the time factor.

On the other side, the effects of the time factor, as seen before, are on different plans. Any investor in this domain will have to know very well the reminded plans and to try and quantify the influence of the time factor in various situations when it is felt. For example, another plan where time factor is felt is the period of reaching the parameters designed after commissioning the manufacturing capacity resulted subsequent to a capital investment.

The scheme of the investment process presented previously, though very simple and relevant, contains many simplified aspects. For example, the value of the manufacturing, respectively the turnover in time, as well as the manufacturing costs are considered constant, evaluated in form of a yearly average. The result is that the yearly profit is constant in time, evaluated also in form of a yearly average during the efficient period of functioning.

In reality, for example in the first years after commissioning the respective investment, the turnover, respectively the production, will be smaller. As long as the equipment will run in and the work productivity will increase, the production, respectively the turnover will also increase, until the designed parameters are reached, and, years later, it will be constant. Similarly, things happen in case of the manufacturing costs; in the first years after commissioning the respective investment, these will be higher, and, after a period of time, two-three years later, the costs will decrease up to the level of the designed parameters.

The idea coming from this reasoning is that the fact that in the first years, the yearly profits are unequal, due to the previously mentioned facts. As long as the investment functions, the respective profits, smaller in the first years since the commissioning the objective, will increase, until the level of designed profits. Any delay in reaching the designed parameters of an investment, whatever the reason of this delay, means an increase of the recovery term of the invested capital and, eventually, a decrease of the final profit, as mentioned before.

The example presented above, related to the impact of the time factor in the context of choosing the designed parameters of a capital investment made, never attracts the attention on the complexity of the quantification of the influence of time factor, which manifests on several plans.

In case of the period of reaching the designed parameters, the respective investment will bring a profit, but a smaller one, then the one designed. That is why, on this plan, the most important conclusion is that any investor should take all measures necessary for the respective period to be reduced a lot. In such a context, the economic efficiency of a capital investment will be influenced favorably, and the indictors of economic efficiency, such as: term of investment recovery, coefficient of economic efficiency of the capital investments, economic output of the investment etc., will fully reflect this aspect.

Certainly that the problems of capital investments in the context of time factor will not reduce at those few aspects presented above. Still, even those few plans presented where time factor is felt and influences significantly the economic efficiency of a capital investment is intended to move any investor on the need to quantify the respective influence.

An area we indent to present later on, related to the impact of time factor, will be the one of dynamic calculation of some economic efficiency indicators of the capital investments where, next to the investment efforts and effects, we will also try to quantify the influence of time factor.

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