Silviu Cornel Virgil CHIRIAC
Dimi OFILEANU
"1st of December 1918" University of Alba Iulia

THE ANALYSIS OF INVESTMENTS IN AN UNCERTAIN ENVIRONMENT

Literature rewiews

Keywords
Investments
Uncertain environment
Cash-flow
Mathematical expectation

JEL Classification
G10

Abstract

The notion of investment is extremely complex, perceived with different meanings and significations. The use of investment strategies in the management activity implies the application of scientific techniques and methods. In order to ensure a constant economic growth it is necessary to prepare investment projects. In practice the predominant one is the investment activity based on real investments performed for the modernising of assets, in order to ensure their physical and moral wear and tear.

1. Introduction

The notion of investment is extremely complex, perceived with different meanings and significations. The use of investment strategies in the management activity implies the application of scientific techniques and methods. In order to ensure a constant economic growth it is necessary to prepare investment projects. In practice the predominant one is the investment activity based on real investments performed for the modernising of assets, in order to ensure their physical and moral wear and tear.

2. General approaches regarding investments

The origin of the word "investment" is found in the Latin word "investire" = to assign, to cover, to dress, initially being a military term (with the meaning to surround a stronghold) and it appeared in the economic language with the meaning of giving up to an immediate use of the available resources resulting from incomes higher than the costs incurred with the purpose of obtaining future benefits.

The notion of "investment" can be found in the international languages under the following names: in English – ,,investment", in Hungarian ,,befektetési", in French – ,,investissement", in Spanish ,,inversion", in Italian ,,investimento", in German – ,,investition", in Russian – ,,   ", in Greek ,,   ", in Slovak ,,investície".

In a general, wider meaning the investments represent a capital placement which is made with the purpose of obtaining profit bearing incomes in the future. In a narrower meaning, investments mean the totality of expenses made for obtaining capital assets which in the future are potential factors in the formation of incomes.

In the specialized literature we find various definitions and approaches on investments: ,,the base of future development of the companies, with a decisive role in supplementation, diversification and quality increase of all the production factors"(Vasilescu, 1998:338), ,,a pecuniary effort made for reaching some purposes" (Stoian, 2003:286), "represents the use of savings for the creation of capital assets and/or capital stocks" (Angelescu, 2002: 223), "the totality of expenses made for the purpose of creating, purchasing new fixed funds, perfecting or reconstructing existing fixed funds, for a longer period of time" (St nescu Constantin, 1996: 658), ,,represent the sacrifice of a part from the present consumption for a (possible and uncertain) future consumption" (Munteanu, 1996: 1). Mercantilism, the first economic reasoning current from the pre-Classical period places the investment concept in a tight relation to "wealth".

Sabate Tarrago (1986:308) said that the investments imply the application of financial resources, creation, renewal, extension or improvement of the company's operation capacity.

For Peumans (1967:21), the investment is the payment of all the funds for purchasing specific assets or durable tools for production, called capital assets, used by the company for several years, to reach its objectives.

Most certainly, the investments in technological innovation will be justified only in the case when there is enough qualified human capital (Burja: 2008). The insufficient allotment of human resources leads to less relevant and less trustworthy information reports (Briciu et.al, 2008).

The concept of investment is an important preoccupation in the professional life of JM. Keunes, who was an investment innovator, introducing the concept of ,,investment multiplier". The most important of Keynes contributions to the professional administration of investment were the strategic assignment of the shares together with the adoption of value-based investment strategies. For him, the investments appear as a current addition to the value of the production equipments, an addition which resulted from the production activity of that period. He considers that the ,,volume of the savings is a result of the collective behaviour of the individual consumers and the volume of the investments is a result of the collective behaviour of the individual entrepreneurs; these two parameters are necessarily equal because each of them is equal to the excess of the consumption income."

The Harrod-Domar model is based on Keynes' theory according to which investments create savings and not the other way around.

The economist David Ricardo approaches the investment activity through the example of the hunter who makes his own weapons; for him the investment in the production means must be achieved from his own sources.

John Stuart Mill, the synthesizer of the Classical current, placed the investment between ,,accumulation" (saving) and ,,development". He approaches the increase of profit (development) through three factors: population, capital and technique.

F. Aftalion sustains that the investment is formed according to demand and incomes (Nenovsky, 2006: 9). For him the action of investing means giving up liquidities in the hope of achieving future incomes.

O.Poupart-Lafarge and R.Heline considers that the achievement of investments affects the resources for reaching the financial and industrial objectives, in the hope to obtain benefits for a longer period of time".

Pierre Masse (1965) sustains that the productive investments are based on long term studies, on the future needs of the consumers, giving up a safe and

immediate satisfaction, in the hope of generating future incomes.

For I. Românu, the investment is the merging of the material and human resources, for the purpose of obtaining profit.

As underlined by Onofrei (2004 ; 143) the notion of investment represents an extremely complex financial category for whose defining he reflected some of its general and homogenous features in report with the forming method or with the destinations received by the financing sources. The investment as a concept can be defined from different points of view: financial, economical or accounting, legal and psychological. In Stancu's opinion (2002, 552) the investment represents the change of an actual and certain amount of money, in the hope of obtaining higher but probable future incomes: the purchase of a machine for the increase of work productivity, the construction of a plant in order to increase production, the assimilation of a patent for the fabrication of new products, etc. According to the same author, the investments in economic or accountancy meaning appear as amounts of money assigned for the production of long term goods, this category including: lands, buildings, equipments, patents etc. which will determine financial flows of exploitation incomes and expenses. Following his endeavour, the author suggests that, if from the legal perspective the investment cover the acquisitions or the closeness of any elements which can represent an object of the ownership right, from the psychological point of view the investment highlights the intention of the individual or the company to invest. From this last perspective, the investor gives up the immediate assets in favour of the future ones, taking some risks.

Bistriceanu, Adochiției și Negrea (2001 ; 124) consider that in achieving an investment project, an important part is played by the solving of some problems, among which:

• the supply of financial resources;

• the choice of financing sources in the conditions of assuring a more reduced cost of the capitals will be used for achieving the investments;

• the recovery of the funds invested and the reduction of the duration of this recovery;

• the reimbursement of credits and payment of the interest on the due date;

• the assurance of a profitability as high as possible as a consequence of the investment works.

Therefore, as observed by Onofrei (2004; 159), the investments imply a significant immobilization of capital, which imposes the necessity of procuring and assuring them, with the purpose of avoiding investments started and unfinished. As underlined by the same author, the investors must not dispose necessarily, from the beginning of the entire amount which will cover the investment expenses; on the contrary it is adequate that the financial resources be formed in parallel and correlated with the process of performing the expenses.

The concept of investment has two directions:

- Capital investments, which refer to acquisitions and modernization of fixed means;

- Financial investments, represented by value titles.

A real estate investment can be acknowledged as asset if it fulfils cumulatively two conditions:

- to be capable to create future benefits;

- the cost of the investment must be evaluated in a credible way.

According to the Guide for the International Financial Reporting Standards (2013:25) "an entity must not recognize in the accounting value of a real estate investment the costs of the daily maintenance of such a real estate. These costs are recognised in the profit or loss account as they are borne."

The costs with the replacement of a part of the real estate are recognized in its accounting value in the moment when they are borne, in case they fulfil the recognition criteria.

According to OMFP 3055/2009, "the investment activities consist of the acquiring and the transfer of fixed assets and other investments which are not included in cash equivalents". The real estate investments are highlighted distinctly within the fixed assets accounts.

IAS 16 „Tangible assets" presents the tangible assets in a general framework, while IAS 40 „Real estate investments" which became valid on January 1st. 2001 applies especially to real estate investments such as lands and building, purchased in order to obtain incomes from rents or with the purpose of appreciating capital, its objective being to prescribe the accounting treatment for the real estate investments and the related ones. According to this IAS „a real estate investment is a propriety (land or building or on part of a building or both) held (by the owner or by the tenant on the basis of a financial leasing contract) in order to obtain incomes from rents or for the appreciation of the capital or both, other (a) the use in production or the supply of goods and services in administrative purposes; or (b) sale during the normal course of business.

IAS 40 "Real estate investments" reviewed in 2005, allows for the real estate held as a consequence of the conclusion of operation leasing contracts to be accounted for as real estate investments.

According to art. 539 from the Civil Code „the assets that the law does not consider to be real estate are personal property."

According to the Fiscal Code, the real estate is represented by any land, building or other construction built or integrated in a land. The fiscal value of the real estate classified as real estate investment is represented by the "acquisition cost, production cost or the market value of the real

estate acquired for free or constituted as contribution on the date of entry in the contributor's patrimony, used for the calculation of the fiscal amortization, according to the case. The fiscal value also includes the evaluation performed according to accounting regulations." (Law 571/2003)

In our opinion the real estate investments can be defined as those real estate assets held by the landlord or tenant in order to cause future incomes.

3. Analysis models of the investments in an uncertain environment

In comparison with the determinist environment, when the cash-flows were known for sure, in an uncertain environment different values of the cash-flows are assumed to be known with certain apparition probabilities. The estimation of the cash-flows pertaining to each of them and the probability of apparition are based on the variations achieved in the previous years or the subjective estimation of the investors or specialists.

Hence, in a uncertain environment the cash-flows estimated in a determinist environment generate a dispersion of the values, according to the evolution of the factors/variables from the calculation model of the cash-flow; the associated risk, measured through the standard deviation, leads to the use of an updated rate different from the one in the certain environment which reflects the risk structure of the project in the context of cash-flow variability.

The estimation of the cash-flows in an uncertain environment is achieved in several variants, each of them being associated to an apparition probability. The possible results and probabilities of apparition are known under the name of probability distribution.

The expected value of the probability distribution of the possible flows or the mathematical expectation of the cash-flows is determined an weighted mean $\overline{(CF)}$, joined by a risk with the help of the square mean deviation – (CF).

Mathematical expectation:

$$\overline{CF} = \sum_{i=1}^{n} CF_i x P_i$$

where:

$\overline{CF}$ - expected value of the flow distribution

CF_i – the value of the flow associated to the i probability

P_i – probability associate to the CF_i value

The standard deviation or mean square deviation is equal to:

$$\sigma(CF) = \sqrt{\sum_{i=1}^{n} (CF_i - \overline{CF})^2 x P_i}$$

where:

– standard deviation

CF_i – the possible values of the flows

$\overline{CF}$ – mean of the possible flow distributions

P_i – probability of apparition of each possible value of the flows

In what regards the choice of the update rate, the issue is to find the most adequate one.

Among the models of analysis of investments in an uncertain environment presented in the specialized literature, we would like to mention the following: sensitivity analysis, scenario technique, the Monte Carlo simulation, the method of the decision tree.

Sensitivity analysis - shows the way the prevision errors influence the present value of the updated flows, consisting in the analysis of the components of the prevision and the study of their impact on the value of the investments or the capital.

This implies the identification of the factors with significant influence on the modification of the indicators of the investment and establishing a variation interval for each influence factor, including the values with the higher apparition probability. Considering the hypothesis of the modification of a single influence factor, we determine the new values of the project indicators and the sensitivity of the project to the modification of each factors, through the identification of an elasticity factor, paying increased attention to the variables with increased volatility. We calculated a profitability threshold for each factor which compares with the variation interval established previously.

The scenario technique – implies the set up of 3 to 5 scenarios (pessimistic, neuter, optimistic) which estimate the values of the variables, considering the correlation existing between them (modifying simultaneously the values for each of the variables of the pattern, hence removing the disadvantage of the sensitivity analysis in which one model variable is modified at the time). Each scenario yields the values of the indicators according to which the decision of adoption / rejection of the analysed project will be taken, in each of the scenarios proposed.

The Monte Carlo Simulation – is a statistical method which uses random numbers for the realization of simulation, generated according to the normal distribution law. The simulation achieves a random selection within the function mentioned, through the generation of random numbers uniformly distributed in the interval [0,1], the procedure is retaken iteratively.

The method consists of the estimation of the value interval for each determining factor of the cash-flow size and the probabilities of apparition for the possible values which that factor can take and the identification of the existing relationship between the level of those factors and the cash-flow size; the casual selection of a value from the value distribution of each determining factor and the estimation of the obtainable cash flow based on the extracted values - iterative process.

Decisions trees – allow the structuring of the decisions referring to the realization of a project and the incorporation in the decision process of the real options: of extension of the initial investment, the postponing or the abandoning (disinvestment).

In the structure of the decision tree we find:

- the branches of the tree, on which there are the estimated variants for the evolution of the treasury flows, accompanied by the apparition probabilities;

- decision nodes, points in which the investor takes a decision (investment, extension, disinvestment, etc.) integrating in the decision process the information accumulated up to that moment.

- income nodes or event type - in which the value is given by the average of the financial flows foreseen for each foreseen state, weighted with the apparition probabilities. In these points the decision does not belong to the investor anymore.

The objective followed is the extended VAN maximization, which also includes the values of the options held implicitly through the achievement of the project, which consists in establishing an optimal pathway to follow, according to the information available in the zero moment, of the first decision.

4.Feasibility of the investment

The feasibility analysis of the investment focuses on the selection of an alternative from several variants possible in order to obtain the best results, keeping in mind the objectives of the investor.

Hence, in order for a proposal to be feasible, it must fit within the constraints of positioning, it must respect the legal regulations and various restrictions regarding the use of the land and it must also ensure the reach of financial objectives of the investor, as seen in the figure no. 1.

We can say that a project is feasible if it has a reasonable probability to reach the purposes of all the participants.

The feasibility analysis must be seen as an iterative and continuous process which becomes more and more complicated while the investor gets closer to the final decision, covering the following phases:

• analysis of the physical and legal aspects of the positioning, the competition;

• estimation of the request for the services proposed;

• estimation of the construction / rehabilitation / consolidation and exploitation costs for the alternatives proposed;

• estimation of the financing costs for various combinations possible of capitals and credit;

• estimation of the incomes which can be obtained (prices at which the units can be rented or sold);

• elaboration of a panel of the flows entry and exit;

• evaluation of the anticipated flows in the conditions of a minimal profitability instalment and the risk that the investor is disposed to accept.

In order to simplify the decision making process and to identify the investment projects which can be eliminated even from the beginning of the analysis, a preliminary financially analysis is necessary to allow a first look on the impact of the income sources and the alternative financing sources. Two approaches appeared within this preliminary analysis: direct approach and indirect approach.

The direct approach implies the estimation of the minimal gross rent to ensure the fulfilment of the investment criteria in the conditions in which the cost of the project is given or implied.

The indirect approach implies the calculation of the maximum amount that the capital and credit investors can assign to the investment project, knowing the minimal capacity accepted by them.

The results of the feasibility analysis are presented in the feasibility study; the information within this report are organized such as to ensure an easiness in the use and the reflection of the purpose for the elaboration of the feasibility study, together with the fulfilment of certain adequacy requirements.

5. Conclusions

Considering the information presented in this paper, we can draw the following conclusions:

- Most of the decisions of the management team, but also of the external users (for example: decision investments) are based on an analysis of the capital market and the accounting information;

- The investment decision is influenced significantly by the financing decision;

- A project is feasible if it has a reasonable probability to reach the purposes of all the participants;

- The estimation of the cash-flows in an uncertain environment is achieved in several ways, each of them being associated to a probability of apparition, known under the name of probability distribution;

- The real estate investments in comparison with other investment categories are heterogeneous, indivisible and have high management costs.

The future research directions are related to dealing with the following aspects:

- the evaluation of the real estate investments;

- the impact of evaluation of the real estate investments on the financial situations of the entity;

- the audit of the real estate investments;

- entities listed at the Bucharest Stock Exchange.

6. Acknowledgements

7. References
Books
[1]Angelescu Coralia, Stanescu I., 2002, *Economie politica: elemente fundamentale*, Editura Oscar Print, Bucure ti;
[2]B descu Gheorghe, Oancea-Negescu Mihaela, 2009, *Analiza investi iilor imobiliare*, Editura Economic , Bucure ti;
[3]John Maynard Keynes, *Teoria general a folosirii mâinii de lucru, a dobânzii i a banilor*, Editura tiin ific , Bucure ti;
[4]Munteanu Costea, Vâlsan C lin, 1996, *Investitii internationale*, Editura Oscar Print, Bucure ti;
[5]Nikolay Nenovsky, 2006*, Exchange Rates and Inflation: France and Bulgaria in the Interwar Period and the Contribution of Albert Aftalion (1874-1956)*, Bulgarian National Bank;
[6]Peumans Henri, 1967,*Valoarea proiectelor investi ionale*, Deusto;
[7]Pierre Masse, 1965*, Le plan ou l'anti-hasard*, Edition Gallimard;
[8]St nescu Constantin, 1996, *Analiza economico-financiar* , Editura Economic , Bucure ti;
[9]Stoian Marian,2003, *Gestiunea investi iilor.* Bucure ti: Editura A.S.E.;
[10]Tarrago Sabate F. *Notiuni fundamentale ale economie de afaceri* , 1986

[11]Vasilescu Ion, 1998, *Strategii investi ionale, în Strategii manageriale de firm* , Editura Economic , Bucure ti;
Regulatory documents
[12]Legea 571/2003 coroborat cu HG 44/2004 privind Codul fiscal cu normele metodologice de aplicare, actualizat prin Ordonan a Guvernului nr.46 din 26 iunie 2014.
Other sources
[13]Dic ionar de economie, edi ia a doua, Editura Economic , Bucure ti, 2001;
[14]Ghid de aplicare a Standardelor Interna ionale de Raportare Financiar , Autoritatea de Supraveghere Financiar , 2013;
[15]Briciu Sorin, Dragu Georgiana Gabriela, Ivan Oana Raluca, *Responsabilitatea fa de furnizori referitor la standardizare - factorul de cre tere a calit ii informa iei contabile*, online la http://steconomiceuoradea.ro/anale/volume/2010/n1/074.pdf, accesat la data de 11.07.2014;
[16]Burja Camelia, Vasile Burja, *Realit i i perspective ale economiei bazate pe cunoa tere din România n contextual integr rii n Uniunea European* , disponibil online la http://mpra.ub.uni-muenchen.de/7842/2/MPRA_paper_7842.pdf, accesat la data de 11.07.2014.
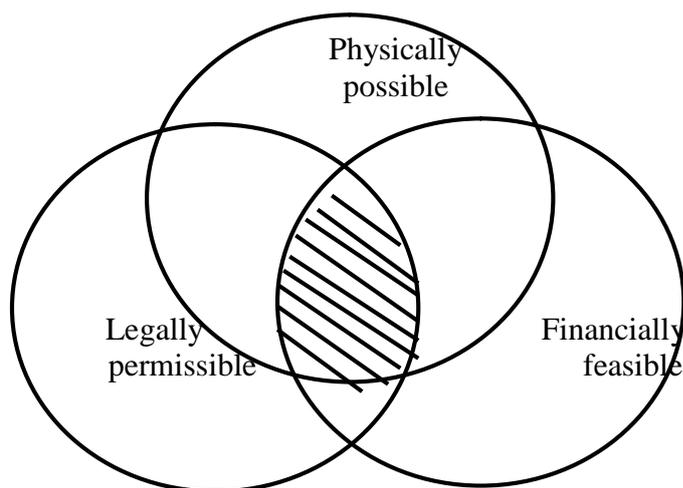
Appendix A

Figure No. 1. Dimensions of the feasibility matter
(Source: B descu, Negescu, 2009:127)