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SPECIFIC FEATURES OF CASH FLOW FORMATION AND ANALYSIS IN THE PROCESS OF EVALUATION OF INVESTMENT PROJECTS' EFFICIENCY

1. Introduction

Investments play an increasingly important role in the current dynamic and competitive business environment. Well-planned and sound investments have a great effect on the financial position, ability to continue to make a profit, development and competitiveness of a company and contribute to the overall growth of the national economy. The efficiency of investments largely depends upon the evaluation of an investment project forecasting the economic and social benefits of the investments. An inaccurate evaluation of an investment project may lead to distortions of the results of investment activities as they will differ from the targets. As a result of this the efficiency of investments may be reduced or they may become loss-making.

Different methods of evaluation of investment projects have been described in the literature and applied in practice. Even though most of them are based on cash flows, the formation of the cash flows and the factors influencing this process are scarcely known.

The purpose of this paper is to examine the mechanism of formation of cash flows and to assess the influence of the related factors over the results of evaluation of an investment project.

2. Composition of cash flows and calculation methods

Cash flow means the cash and cash equivalents which come into a company less the cash outflow during an accounting period [*Verslo apskaitos...* 2004, p. 64]. Although the final evaluation of an investment project is based on the cash flow

generated by the project, it is important to understand that the cash flow is an integrated value formed by different activities implemented in the project operation period. Many authors [Aleknevičienė 2009; Checkley 2002; Fight 2006; Mackevičius 2007; Reider, Heyler 2003; Vilenskiy et al. 2004] recognise the following groups of activities: (1) cash flows from operations; (2) cash flows from investment activities; and (3) cash flows from financial activities. The classification of cash flows according to core operations, investment activities and financial activities shows the sources of the inflows and the purposes and means of the outflows. Such grouping of cash flows provides systematised management information necessary for the adoption of operational and strategic management decisions and for ensuring control over the cash flow formation. Evaluation and adoption of investment decisions/projects is also based on such information, therefore, it is very important to establish a clear grouping of investment flows and to clearly determine the basis for the grouping.

Cash flows from operations are the cash flows from those activities from which the company earns the largest part of its income. This means that they usually arise from transactions or other events used as a basis for the determination of net profit or loss. Depending on the selected method of cash flow formation, two distinct calculation methods can be identified: (1) direct and (2) indirect. The aggregate cash inflows and outflows are calculated by the direct method. It is used most frequently when the estimations are limited to the cash flows and no other performance indicators of the company are calculated for disclosure in a balance sheet or a profit and loss account.

The indirect method of the cash flows calculation is more widespread: it is based on the company's net profit adjusted for the actual cash receipts or payments under all items of the core activities. There is a wide range of items of cash flows from operations. Approximately 15-20 items of cash inflows and outflows are identified in the National Business Accounting Standard (BAS) 5 and the International Accounting Standard (IAS) 7, however, it is sufficient for the purposes of an investment project analysis to confine oneself to a few key items, with the requisite level of detail which is determined by the specific features of the project. E. McLaney [2006], E. Brigham and M. Ehrhardt [2002] propose that for the purposes of analysis of an investment project the cash flow from operations should be equal to the sum of the net profit/loss and the annual depreciation adjusted for the change in net working capital. Such view is in line with the provisions of BAS and IAS and reveals the substance of the cash flow formation.

Figure 1 presents the schematic diagram of the formation of cash flows from operations using a production investment project as an example. In case of a project in the trade or service sector, the cash flow formation process would be similar, with some adjustments for the specificity of business. In a production enterprise, the main
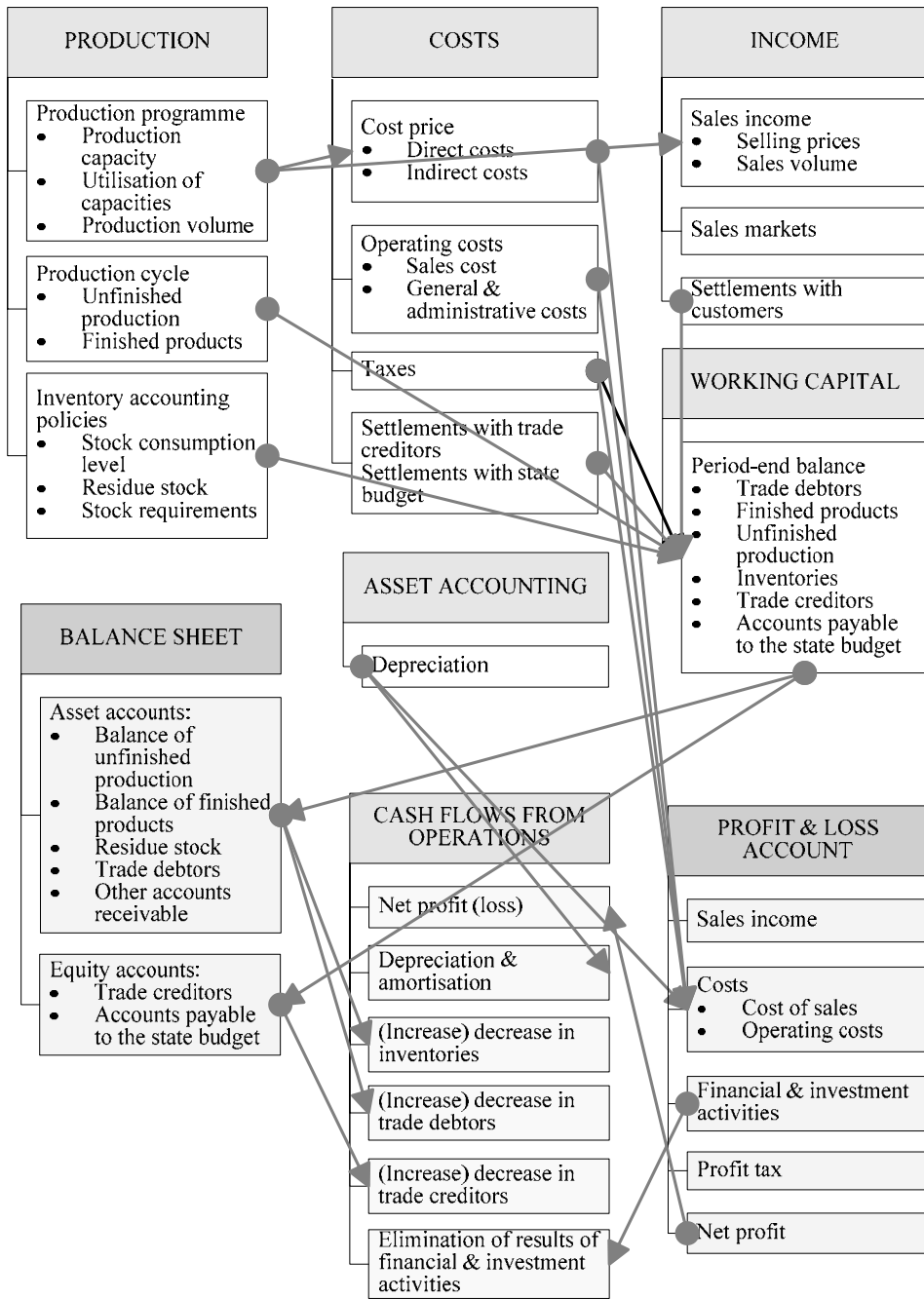
Figure 1. Schematic diagram of cash flows from operations of a company

Source: compiled by the authors.

part of incoming cash flows is formed by the products manufactured and sold, while the outflows are based on the amounts of money paid to suppliers, employees and the state budget. All the fixed-asset transactions fall into other cash flow groups. Whereas fixed-asset transactions form a basis for a real estate development company's cash flows from operations. Thus, planning of the cash flows from operations requires an exact definition of the activities planned, a detailed description of business processes, and a number of interim and auxiliary calculations resulting in the drawing up of financial statements. Using these statements as a basis one may reliably determine the cash flows of the project and to construct a logical chain of cash flow formation, linking it with the approved accounting policies.

Figure 1 shows a simplified model of business processes (i.e. production or provision of services), which incorporates different aspects of functioning of a company that are related to the carrying out of the operations. All the factors described in the model must be reflected in the financial calculations of an investment project. The more detailed the description and the determination of the interrelationships, the more reliable the calculation results. Such requirement for detail in the calculations is explained by the fact that the size of cash flows from operations is the main indicator showing how large are the cash flows generated by the company that would be sufficient for the repayment of loans, maintaining of production capacities, payment of dividend and making new investments without using external financing sources.

Cash flows from investment activities represent the cash flows related to the purchase and sale of investments. They show how much money the company has spent, in the accounting period, for the acquisition (construction/repairs//reconstruction) of real estate, securities etc. and how much money it has received from transfer of fixed assets, recovery of loans from third parties, interest on loans made, etc.

As shown by experience, an analysis of an investment project usually results in a negative cash flow from investment activities as the cost of fixed assets' acquisition is higher than the asset selling price.

Figure 2 shows which investment items have a decreasing and which – an increasing effect on cash flows. Although the number of items is limited, they are large in scope and, therefore, significant. The figure reflects the scope and timing of investments, i.e. those factors which determine the efficiency of investments.

Cash flows from financial activities are the cash inflows and outflows related to changes in equity capital and the companies' liabilities related to the money lent. They show how the company has used the external financing sources and what were the changes in the company's financial relations with third parties in the accounting period. Thus, as distinct from the operations and investment activities, financial activities are connected with the external rather than internal factors influencing the project.
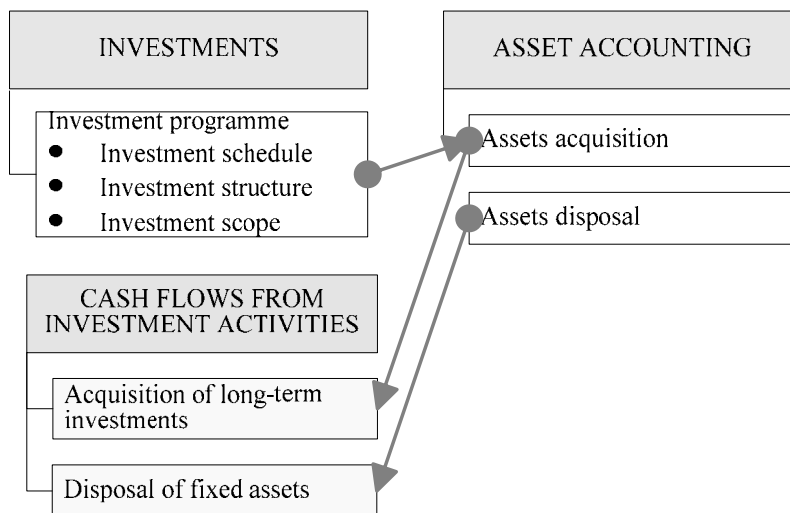
Figure 2. Schematic diagram of cash flows from investment activities of company

Source: compiled by the authors.

The formation of cash flows from financial activities is shown in Figure 3. An analysis of these cash flows assists in the forecasting the claims for future cash flows by the providers of capital to the company and shows the company's use of external financing sources in the accounting period. Cash flows from financial activities are closely related to investment activities of the company. External financing is sought if cash from operations is insufficient. The external financing sources and the discharge of the financial obligations assumed are disclosed in the cash flows from financial activities.

An analysis of cash flows from financial activities forms part of evaluation of an investment project, however, such cash flows do not have a direct effect on the final results of the evaluation. The elimination of external financing and its costs is key to the analysis. Therefore, such items as financial lease payments, loans received and repaid, interest paid, issue and buy-up of shares and dividend paid must be eliminated from the project's cash flow [Aleknevičienė 2009; Brigham, Ehrhardt 2002; Vilenskiy et al. 2004] because both borrowing costs and costs of own funds are reflected in the weighted cost of capital and have an effect on the results of evaluation of an investment project through the discount rate applied [McLaney 2006].

So far we have been discussing the structure of cash flows above but the method of calculation of cash flows is also important for the analysis of an investment project. One of the following methods can be applied: (1) analysing and comparing two scenarios of the company's activities – "with the project" and "without the project", with the identification of the cash flows of the investment project under

consideration; (2) direct calculation of the cash flows of the investment project including the calculation of the increase in the cash flows based on the estimated results of the project.
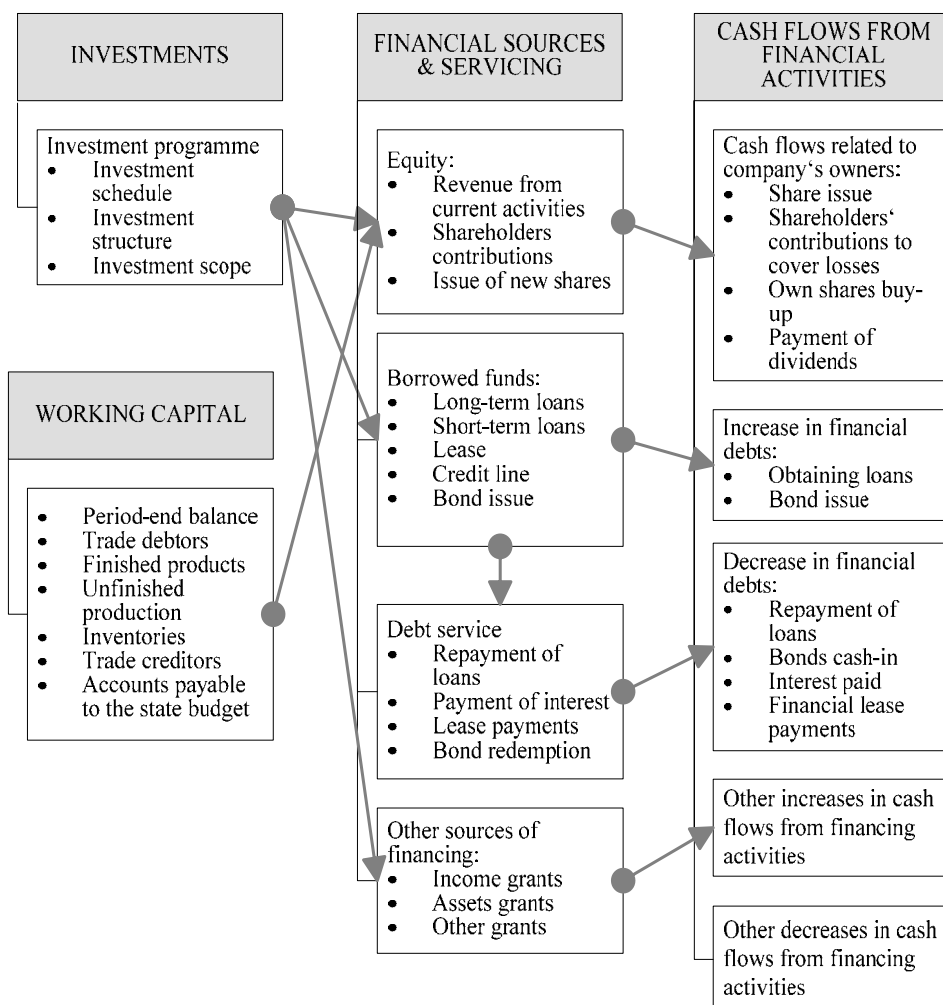

Figure 3. Schematic diagram of cash flows from financial activities of a company

Source: compiled by the authors.

Where the first method is applied, the cash flows of the investment project can be easily calculated as the difference between the company's cash flows under both scenarios. As the process of implementation of an investment project is a long one and usually takes several years, sometimes even longer than a decade, a generalised

equation for the calculation of cash flows would look as follows [Brigham, Ehrhardt 2002]:

$$CF_t^p = CF_t^{sp} - CF_t^{bp},$$

where: CF_t^{sp} is the net cash flow in period t upon completion of the investment project, CF_t^{bp} is the net cash flow in period t where no investment project has been implemented.

Such method for the calculation of cash flows is proposed by the European Commission, the UN Industrial Development Organisation (UNIDO), some Lithuanian authorities (Central Projects Management Agency, Information Society Development Committee, etc.) and researchers [Aleknevičienė 2009; Rutkauskas 2007].

Sometimes, however, it is simpler to calculate the cash flows for an investment project directly without analysing current operations of the company. In particular, this is appropriate when the project represents a new area of activities not related to the current operations. In such a case an increase in the cash flow related to the new area must be calculated [Van Horne, Wachowicz 2005; Vilenskiy et al. 2004].

In both cases, as a general rule, the assessment must be limited to those cash flows which are directly related to the implementation of the project and were incurred not earlier than the date of the investment decision. Alternative costs, i.e. the costs that would apply if alternative assumptions were adopted, are also included in the costs directly related to the implementation of the project [Agar 2003; Cibulskienė, Butkus 2007; Van Horne, Wachowicz 2005]. It should be recognised, however, that the latter approach is taken rarely as a possibly subjective one.

3. Factors influencing the cash flow dynamics and their effect on the results of evaluation of an investment project

The value of an investment project can be expressed as a function of three variables: (1) the cash flows generated by the project; (2) the period in which the process takes place; and (3) the level of uncertainty related to the cash flows [Damodaran 2001].

Therefore, it is very important to address the issue of timing of cash flows. The issue has two relevant aspects: (1) distribution of cash flows within the project period; and (2) distribution of cash flows within a period selected for analysis (usually one year). In the first case there it is the well-known issue of time value of money. It can be easily resolved through the application of different discounting methods and we will return to it later. In the second case the substance of the issue remains the same: the distribution of the cash flows generated by the project is either even or concentrated on any period within the year depending on the seasonal or cyclical specificity of business [McLaney 2006, p. 146]. In distinction to the first case, such distribution of cash flows is eliminated in the analysis, assuming that the entire cash flow emerges at the end of

the year. The bias of such an assumption influences the final result of the analysis, which is artificially reduced. To address this issue it is proposed that monthly or even continuous cash flows rather than annual cash flows should be discounted [Vilenskiy et al. 2004, p. 172] or the annual cash flow indicator should be applied through adjustments of the annual discount rate [Hitchner 2006, p. 77].

Returning to the distribution of cash flows within the investment project period, one may note that the cash flows are not even. The unevenness and the direction and amplitude of the cash flow fluctuations are determined by the following key factors:

1) initial investments at the beginning of the period require considerable financial resources as a result of which the initial cash flow of the project is negative, with the cash flow volume depending upon the amount of investment costs;

2) in the operating phase of the project when new technologies, working methods and other project innovations are being adopted, the cash flows are gradually increasing until a certain level of design capacity is reached. The stability which is reached is relative as it strongly depends upon the market conditions, demand and other factors of internal and external environment, therefore, there are some cash flow fluctuations in this phase as well;

3) in the project winding-up phase, revenues are collected from all sources and payments are made to employees, banks, the state and any other creditors. The cash flows are similar to those in the second phase. The other part of the project cash flows consists of money inflows and outflows related to the disposal of assets. Although most assets have been fully depreciated and their book value is close to zero, some assets still have a market value, which has an increasing effect on the cash flows in this phase.
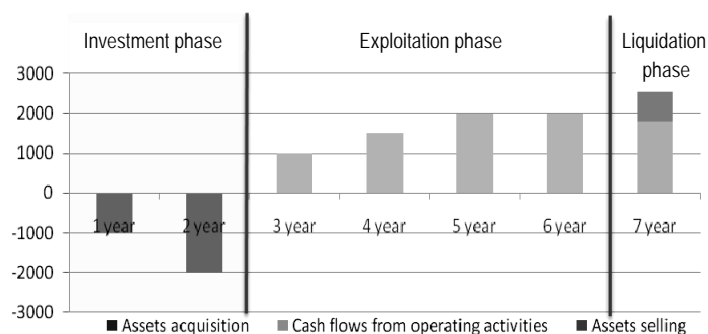

Figure 4. Typical cash flows during the life of an investment project

Source: compiled by the authors.

Figure 5 shows the unevenness and directions of cash flows by investment project phases. An important factor of the unevenness of cash flows is the varied timing of making of investments and receipt of money, i.e. the beginning and end

of these events. Three types of processes are recognised: (1) consistent process of investment and revenue collection – the revenue is collected immediately after the investment (see Figure 5a); (2) parallel process of investment and revenue collection – the revenue can be collected before the end of the investment process (see Figure 5b); and (3) interval process of investment and revenue collection – the revenue is collected upon expiration of certain period after the end on the investment process (see Figure 5c).
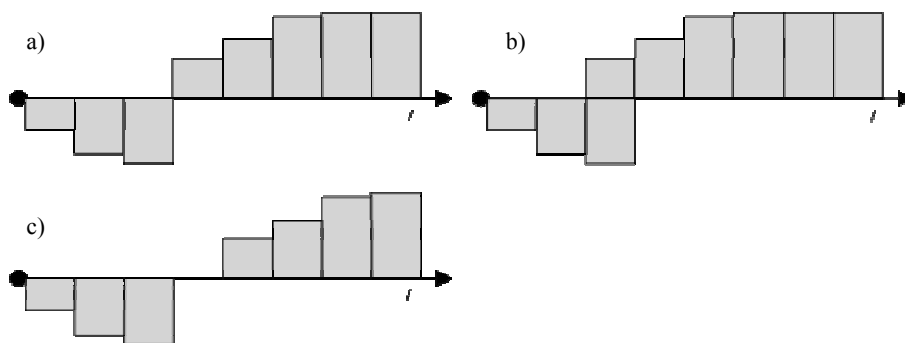

Figure 5. Investment making and revenue collection in projects of different types

Source: [Staroverova et al. 2006].

The estimated volumes and the timing of cash flows from certain activities influence the formation of the project financing structure and the adoption of investment decisions in general. In the former case, additional cash flows from operations reduce the need for borrowing, i.e. the financing costs. In the latter case, a negative result of evaluation can be determined by a long period (interval) of postponement of the project's operational phase. This is due to the above-mentioned fact that cash flows with the same volume but with different timing have different economic value.

The last variable in the function – the uncertainty of cash flows – can be treated very broadly. On the one hand, it represents the risk arising from the need to forecast and the related uncertainty which is measured by means of econometric models. On the other hand, it represents a number of factors influencing the cash flows of an investment project, which can be described and included in an analysis. In summary, these factors can be divided into external and internal ones and grouped according to influence areas. Some of the factors (taxes, policy of settlements with customers and suppliers, interest rates, etc.) are included in the calculations of cash flows from operations or from financial activities and can be evaluated more or less reliably, whereas other factors are often ignored or underestimated as insignificant ones. Such factors include inflation (or deflation), taxes and depreciation of assets.

The annual inflation/deflation rate expressed as a percentage is most often used in the determination of the effect of inflation/deflation on cash flows. This rate shows the annual increase or decrease in prices during one year. One of the following methods of analysis is selected depending on whether the effect was determined in the forecasting of the cash flows or not [*Cost-Benefit Analysis...* 2008, p. 205]: (1) the future nominal cash flows (i.e. cash flows at constant prices) are discounted using the nominal discount rate, or (2) the future real cash flows (i.e. cash flows at current prices) are discounted using the real discount rate.

Although amortisation costs have no direct effect on cash flows and must be eliminated from the calculations, by the selection of an amortisation method one can influence the amount of profit tax payable in the current period and, at the same time, the cash flows of an investment project.

By adjusting the discount rate applied in the final evaluation of efficiency of an investment project, one can forecast the effect of factors not included in the initial calculations. In such a case, the discounting of the cash flows is based on the additional risk (r) adjusted for the discount rate ($d+r$) rather than on the capital cost (d) [Higgins, 2007, p. 319].

4. Conclusions and proposals

1. The classification of cash flows of an investment project according to 3 types of activities both facilitates the analysis and allows avoiding errors where cash flows which are not related to the project or which distort the results are included in the calculations.

2. The formation of cash flows from operations is the most important and the most complicated process. Different options are proposed, however, they have the same purpose – to describe the business processes of a project in a most detailed and objective way and to determine the main factors influencing the processes.

3. Depending on whether the project represents a new activity or an extension of current activities, the forecasting of the cash flows can be limited to the investment project, with the calculation of the net cash flow increment, or two scenarios ("with the project" and "without the project") can be analysed, with the difference between them representing the cash flow of the investment project.

4. The calculations of the cash flows made as part of evaluation of an investment project should include as many factors as possible. If this has not been done, it would be possible to make adjustments to the final cash flows by adding a risk (uncertainty) premium to the discount rate applied.

5. The methodology of cash flow formation and analysis described by the authors enables consistent preparation of the cash flow information for an analysis of an investment project of any complexity and the evaluation of the effect of different factors on the results of the analysis.

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