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Net Present Value (NPV) as a Tool Supporting Effective Project Management

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Abstract—**The aim of this paper is to present how Net Present Value (NPV) can be used as a proper tool to ensure effective project management. The author proves that investment project's appraisal methods, such as e.g. NPV, can and should be used as an ongoing monitor of project health. What is more, even in case of project turbulences Net Present Value can be used as a key instrument for finding the most appropriate solutions.**

Keywords—project management; Net Present Value (NPV); risk management; capital budgeting

I. INTRODUCTION

In order to be able to make right decisions regarding capital investments that lay in the best interest of its shareholders the company needs to apply a common decision rule. Such approach enables the decision makers to distinguish between the feasible proposals and those that cannot be executed. One way of placing multiple alternatives into a common frame of reference is to use a decision – making tool called Net Present Value (NPV).

Economic turbulences and pressures that shook global markets recently have clearly indicated that corporate management nowadays is all about not yielding to any changes in project assumptions. Currently there are numerous available reports on project overruns and a really conservative estimate is that approximately 50% of construction projects overrun and approximately 63% of all information systems projects encounter significant budget overrun [1]. The values of these overruns are said to be typically between 40 and 200 percent [2]. Project sponsors claim that although most projects are eventually completed more or less to specification, they are seldom on time and within the budget and it has been suggested that a good rule of thumb is to add a minimum of 50% to every time estimate, and 50% to the first estimate of the budget [3].

Project managers need to know the consequences of any unexpected changes in the project plan. What is more, they also need to understand any potential penalties or benefits (in cost terms) of delays in the project. Moreover, the important thing is also to be aware of the influence of all these difficulties on the project's profitability calculation.

It is exactly Net Present Value that can help to understand the implication of the decision to take or not to take any actions on investment appraisal. NPV may also help the project manager to choose the best approach under the given circumstances by conducting e.g. sensitivity tests. Finally, if the solution has been already found, NPV may easily be used as a empirical evidence to support it.

II. NET PRESENT VALUE (NPV) - FORMULA

The idea of NPV encompasses the concept of the time value of money and takes into consideration that money spent or obtained in future periods will have a different value than money spent or obtained in the present [4].

The calculation formula for Net Present Value has been presented below in (1):

$$NPV = \sum_{t=0}^{N} \frac{CF_t}{(1+r)^t} \tag{1}$$

Here, CF_t is the expected net cash flow at period t, r is the project's cost of capital and n is its life [5].

For the decades Net Present Value has been a standard method for the financial appraisal of projects. NPV calculations can be currently found in every project document (business case, project plan etc.) and project managers throughout the world use this methodology to compare the value of different projects against investment targets.

The company in which the author works as CFO since 2007 – RWE Polska – had to decide about 12 investment projects with higher volume in 2009 - 2010. For 9 of these projects the NPV was used as a tool to give the basement for the decision in the board meeting. The other 3 were solved/calculated with the tool "cost comparison" (method if the future cash flows are not influenced by the different investment alternatives).

III. Net Present Value (NPV) in Project Management

There's also another way Net Present Value can contribute to effective and successful project management. It can serve well as a mobilizing factor – mobilizing project managers to deliver reliable project assumptions thus making them aware that both their company cannot afford to have their projects fail in any aspect, in particular when it comes to technology, time or finances.

Setting a goal to achieve the project's NPV set at the moment of project's authorization mobilizes project managers to prepare reliable forecasts, adapt proper risk management techniques (if required), and finally deliver what they have promised (in the forecasts) and thereby contributes to overall project success.

A. Forecasting and Capital Budgeting

Delivery of accurate forecasts of a numerous variables (cash flows, macroeconomic data etc.) is inherent in all capital budgeting and investment appraisal methods. The decision – maker is faced with lots of data each of them having impact on the project. If the estimation for a project is wrong the project is in trouble from the outset.

The project managers inevitably point to the difficulties that are inherent in estimating the timescales, resources and hence the costs of their projects. If they underestimate they will certainly run out of budget and maybe destroy the benefits case. On the other hand, if they over - estimate the project may not get the green light because it will not justify its own costs or that it will be simply too expensive. Therefore some of them tend to exaggerate the discount rate treating it as a kind of buffer that is supposed to incorporate all inherent risk of the project, including the volatility of variables [7].

Running sensitivity test based on NPV helps to visualize project manager what would be the reaction of his project profitability when challenged with forecast deviations. Bearing in mind that any potential deviations may destroy their work project managers will definitely put more heart and attention into the process of forecasting and capital budgeting.

B. Risk Management

Another very important aspect in project management process is a proper risk management / risk controlling system. Being able to identify any potential project risks in advance and manage them properly is a real advantage in today's market surrounding.

In general projects are subject to uncertainties due to the three major sources: external factors, poorly defined methods for project realization (as most of the projects are unique ventures) and finally shifting business objectives. Almost all methods of risk management appear to favour a three - step methodology: identification, evaluation and risk mitigation or hedging [7].

There are two general types of risk management actions that can be applied in project management. The first one is oriented towards the reduction of the risk's degree. However, as the risk cannot be fully eliminated, there's also a second type of strategy in place, i.e. hedging of risks.

In the process of preparation of the assumptions to the Net Present Value calculation project managers need to make up their minds and consider any potential risks that may emerge throughout the process and the impact these risks might have on the investment profitability. Finally, they need to find the way how to minimize the probability of risk occurrence and if it doesn't help on potential risk mitigation / hedging instruments that could be applied.

C. Reporting

Even in case of the projects that are running according to the plan, reporting activities are often treated as additional and unnecessary bureaucracy. Nevertheless, in the vast majority of the project it cannot be avoided. Therefore the crucial thing is to be able to transform it into a benefit by for example continuously reviewing the impact of the potential changes on project's Net Present Value. Such approach may contribute not only to broadening of project manager's knowledge but also to help him understand the dynamics of the project.

In RWE Polska we report on regular basis about the project success and deviation in costs/revenues. This report is prepared by the Project Office and presented to the board. Basement of the report is the business case (NPV).

D. Promise and Deliver

One of the thorny issues existing within the area of Net Present Value is the fact that in the majority of cases after getting the project finally authorized there is no further attention given to the project's NPV [1]. Such approach is definitely wrong.

Project managers often go through a prescribed project planning process, they produce sufficient documentation to satisfy audit requirements and then just head off in their own direction. While they always know what it is their project scope (i.e. what they have to do), it's often not until the end of the project they examine what it is they were supposed to achieve, by which time it is too late. From such perspective NPV calculation can easily serve as management tool, i.e. when it comes to the final verification whether all project benefits (reduced costs, increased revenues,

efficiency and performance improvements) indicated in the business case at the very beginning of the project have been finally delivered at the end of it. All it takes is to finally compare the assumptions of the NPV calculation with the outcomes of a given project.

RWE Polska - introduced a project called "promise and deliver". It was launched after it was visible that from the above mentioned nine projects based on NPV method seven projects needed more OPEX than planned. And in four projects the revenues (or cost savings) were overestimated by the project managers. The result was a too optimistic project calculation with the effect that the board agreed to perform the project according the wishes of the project manager. Now the company combines the outcome of "promise and deliver reporting" with the bonus system of the project managers.

ACKNOWLEDGMENT

Project management is a field with many standards and well established concepts and knowledge areas. But even if we follow a bible of project management like PMBOK – the Project Management Body of Knowledge – of the Project Management Institute there are gaps in the concepts. A knowledge area on project finance for example is totally missing. Core concepts like NPV must be strengthened in project management to make a significant contribution to the development of project management.

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