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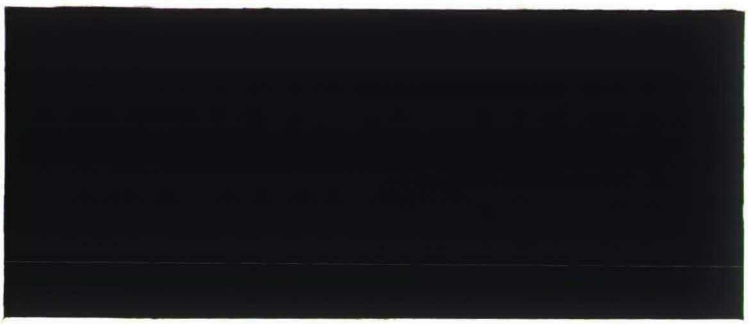

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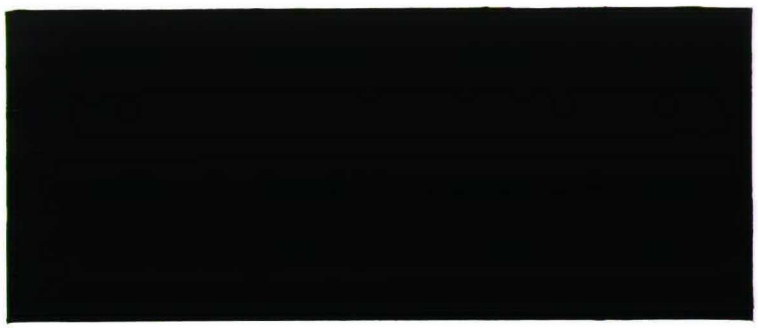

MANAGEMENT'S INFORMATION NEEDS AND THE DEFINITION OF COSTS
with special regard to the cost of interest

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MANAGEMENT'S INFORMATION NEEDS AND THE DEFINITION OF COSTS,
with special regard to the cost of interest

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1. MANAGEMENT'S NEEDS FOR ACCOUNTING INFORMATION

It does not need a high level of abstraction to describe an organization as a bundle of projects, each in its own phase of development, tied together by a whole of organizational activities. The primordial decision in organizations, whether oriented at profit making or aiming at other goals, is the investment decision. At that occasion is decided with which processes and up to which capacity the organization enables itself to participate in the activities of the environmental system. Investment decisions will be made to benefit the organization's goals, taking into regard the perceived, (self-)imposed restrictions.

One of these restrictions is the need for continuity of the organization itself. Among the various aspects of this concept there is the financial aspect, which in case of the investment decision can be operationalised by the nonnegativity restriction on the present value of the cashflow, generated by this project:

$$(1.1)\quad PV = \sum_{t=0}^{T} \{ CR(t) - CO(t) \}/(1+r)^t$$

where CR(t) and CO(t) denote the cash receipts and cash outlays in period t, r the discounting rate and T the lifetime of the project under decision. At the moment of the decision these magnitudes are represented by their expected values, evaluated under a lot of conditions. Hence the management is highly interested to be informed, period by period, about the actual performance of each project, and that in respect of two questions:

a. Does the historical decision to invest threaten now or in the (near) future the organization's financial continuity ?

b. Is the project still a viable one under present conditions ?

Apart from these project-oriented questions there is an organization-oriented one:

c. Are the organizational activities adequately designed for interlacing the actual bundle of projects ?

It is the management accounting system that has to provide the answers on these questions. The method of cashflow accounting reports directly about the actual values of the variables figuring in (1.1) and their variances in respect of their estimates [Lee, 1980]. Notwithstanding the proven power of this method on the level of the organization as a whole, in analyzing its profitability over years [Lawson, 1980], it implies serious difficulties in interpreting its results on a low level of aggregation and shorter periodicity. This mainly by lack of a comprehensive distinction between timing differences and errors in estimation of quantities, leading to the question: Did we spend

too much or too early ?

The traditional method of accrual accounting uses the concept of realized profit as a central element in its reporting system. In the next section of this paper we will describe the relation between the decision criterion (1.1) and this concept of realized profit. It is quite amazing that the congruence between realized profit, being the central issue of reporting, and the present value criterion, being the central issue in decision making, is lacking in the regular handbooks of accounting. Section 3 presents a digression on the cost of interest which in the present author's opinion is misunderstood, especially in the Anglo-american litterature and regulations. How tempting it may be to consider the consequences for the concept of book value as well as the aspects of the valuation base, these subjects relating to question b should be postponed to another time. Section 4 will be devoted to the problems arising in question c, widening our scope from project profitability to the profitability of the organization.

To what extent these accounting concepts are relevant for management, as the motto of this congress states, can be answered solely by comparing the effectiveness and efficiency of management decisions using different accounting systems in comparable circumstances. In the author's opinion consistency in accounting concepts is a first condition for this relevance aimed at.

In this paper an effort is made to promote this consistency on several points.

2. PROFIT AND THE PRESENT-VALUE CRITERION

When we imagined the organization as a bundle of projects, tied together by organizational activities, we stated implicitly that an organization is more than the bundle of projects itself. Postponing the consequences of this for a while, we consider first the project-related concept of profit.

In formula (1.1) we defined the present value of a project's cashflow. In order to derive a magnitude which informs management period by period about the realizations of this present value, it is an administrative custom to centre the attention to revenues instead of the cash receipts mentioned in (1.1) and on costs instead of cash outlays. This implies a reformulation of (1.1) in the following steps:

$$(2.1)\quad PV = \sum_{t=0}^{T} \{ R(t) - E(t) \}/(1+r)^t + \sum_{t=0}^{T} \{(CR(t)-R(t)) - (CO(t)-E(t))\}/(1+r)^t$$

This first step of this reformulation uses R(t), the revenues of period t, and E(t), the expenditures of period t, measured at their 'critical moment' which is generally defined

by the invoicedates. The differences between these variables and their cash counterparts, mentioned in the second summation of (2.1), are the changes in debtors' and creditors' balances, taken together by $\Delta W(t) = W(t) - W(t-1)$, where $W(t)$ represents the balance value of claims on 'Debtors' minus the balance value of liabilities to 'Creditors' at moment t, under the conditions that $W(-1) = W(T) = 0$. This leads to

$$(2.1') \quad PV = \sum_{t=0}^{T} \{R(t) - E(t)\}/(1+r)^t - \sum_{t=0}^{T} \Delta W(t)/(1+r)^t$$

The second step of the reformulation of (1.1) consists of a confrontation of the revenues of each period -which ex post are measurable- with a magnitude which, in respect of its profile over time, is comparable with these revenues: we define the costs of those periods. That means, we allocate the expenditures $E(t)$ to different periods by allocation coefficients $a(t,t')$ which are subject to the restriction

$$(2.2) \quad \sum_{t'=0}^{T} a(t,t') = 1 \quad \text{for all } t$$

Verbally stated these coefficients describe the fraction of expenditures of period t which has to be allocated to the costs of period t'. Restriction (2.2) states that this allocation has to be complete.

This allocation can be described by the following derivation:

$$\sum_{t=0}^{T} E(t).(1+r)^{-t} = \sum_{t'=0}^{T} E(t').(1+r)^{-t'} =$$

$$= \sum_{t'=0}^{T} \sum_{t=0}^{T} a(t',t).E(t').(1+r)^{-t'} =$$

$$= \sum_{t=0}^{T} \sum_{t'=0}^{T} a(t',t).E(t').(1+r)^{t-t'}.(1+r)^{-t}$$

which, apart from the discounting factors, can be seen as the interchange of adding row totals of a table by adding column totals of the same table to get the general total. Substituting this result into the first summation of (2.1') leads to

$$(2.3) \quad \sum_{t=0}^{T} \{R(t) - E(t)\}.(1+r)^{-t} = \sum_{t=0}^{T} \{R(t) - \sum_{t'=0}^{T} a(t',t).E(t').(1+r)^{t-t'}\}.(1+r)^{-t}$$

The terms defined by the second summation in the righthand side of (2.3) are exactly what we define as the costs, allocated to period t: that part of the expenditure of period t' that has to be matched with the revenues of period t, summed over all t'. Generally $a(t',t)$ takes zero-values for $t' > t$, except in case where we have to make provisions for future expenditures.

Since we have only one restriction (2.2) for each t' on the T values of a(t',t), it is clear that Thomas [1969, 1974] stated that each allocation method is arbitrary. However, we cannot circumvent this arbitrarity in defining costs matched with revenues. Hence we need supplementary conditions to absorb the T.(T-1) degrees of freedom. These conditions are given by additional assumptions for the timeprofile of costs or categories of costs, viz. variable costs follow the time profile of production, fixed costs have a constant time profile. Alternative assumptions are: the internal rate of return for the project is the same for each period, or: cost of production of a unit quantity of product is independent of the moment in time this unit is produced etc..

Costs are not real, in the sense that they cannot be observed; they are just the image which the manager gets presented of the expenditures when he looks to them through the spectacles, provided by the accrual accounting system. Spectacles which he needs in order to see these expenditures in a timeshape comparable with that of the revenues, enabling him to compare both of them at the same moment in time, over the same period of time.

It is the need of the spectator which defines the focus of his lenses. In the same way it is the need of the user which defines the allocation procedure. But at which way we are looking to the cost image, we need a consistent one.

We also see in the righthand-side of (2.3) that the cost terms include an interest factor $(1+r)^{t-t'}$, called by a Dutch author [Van der Schroeff, 1980] the time dimension of costs, which is caused by the timeshift of the allocation process from the moment of expenditure t' to the moment of cost recognition t. In the next section we go further into the character of interest costs, here we return to the reformulation of (2.1') and the profit concept as such.

For we reformulated only the first term in the righthand side of (2.1'), we now have to reformulate the second term as well:

$$- \sum_{t=0}^{T} \Delta W(t).(1+r)^{-t} = -[\sum_{t=0}^{T} W(t).(1+r)^{-t} - \sum_{t=0}^{T} W(t-1).(1+r)^{-t}] =$$

$$= - \sum_{t=0}^{T-1} r.W(t).(1+r)^{-(t+1)} = - \sum_{t=0}^{T} r.W(t-1).(1+r)^{-t}$$

The first step in this reformulation follows from the substitution of the definition for $\Delta W(t)$, the second step holds by using the conditions that $W(-1) = W(T) = 0$, and the third step by using again that $W(-1) = 0$. Substituting (2.3) and the result from the reformulation above into (2.1') gives

$$(2.4)\quad PV = \sum_{t=0}^{T} [R(t) - \sum_{t'=0}^{T} a(t',t).E(t').(1+r)^{t-t'} - r.W(t-1)].(1+r)^{-t}$$

or in words: The present value of a project equals the sum over all periods of the project's lifetime of the discounted value of each period's difference between revenues and their matched costs, subtracted with the interest over the net Debtors-Creditors balance at the beginning of that period.

There are evidently two major kinds of costs in the formula (2.4): the costs of goods

sold, defined by

$$(2.5)\quad C(t) = \sum_{t'=0}^{T} a(t',t).E(t').(1+r)^{t-t'}$$

and the costs originating from the delay between sales/expenditures and their cash counterparts, r.W(t-1).

Amongst the infinite number of possibilities in which the present value defined by (2.4) will be at least zero there is one which is very comprehensible, viz. the one for which each term is non-negative. Thus the answer on question a, does the historical decision to invest threaten now or in the (near) future the organization's financial continuity, can be answered in the negative for each project, period by period, when the period's profit for that project, as well as the most recent expectations for the near future values of that variable, are nonnegative.

This yardstick of period profit is absorbing smoothly every adaptation of plans and projects.

We may note that (2.4) is defined in historical cost terms. The need for current cost information comes from question b, is the project still a viable one under present conditions, but this question is beyond the scope of this paper.

3. THE COST OF INTEREST.

Recently litterature is reflecting a renewed discussion of the role of cost of interest in accounting. See for instance Anthony [1975], Amey [1980] and Bartley [1982]. In the late twenties Dutch writers (e.g Limperg, re-edited by Groeneveld [1968]) reached the conclusion that costs of interest are not an independent kind of costs, but ought to be seen as a dimension of the costs; costs having three dimensions, viz. quantity, price and time. Time refers to the duration that financial means have been absorbed by the source of the cost (labor, inventory, capital goods etc.). Evaluation of this time dimension is independent of the source of capital, equity or lenders, as well as it is with regard to the ratio of equity in total capital. In the opinion of these writers the rate of interest which ought to be applied in the evaluation of the time dimension is the riskfree rate of interest.

Well, as can be seen in the derivation of costs, leading to (2.5), the interest dimension in costs of goods sold originates from the timeshift between expenditures and costs. Besides these cost of interest, there are the interest costs originating from the timeshift between revenues/expenditures and their cash counterparts. These interest costs do not have the character of a dimension of other kinds of costs, but are tied up directly to balance sheet items. Up till now not mentioned, but comparable with the

latter interest costs, there are the interest costs on cashbalances needed for the transactions. It is worthwile to realize that interest costs are a result of accrual accounting, that under the system of cashflow accounting there's only mention of revenues, to be divided between the providers of equity and those of lenders' capital. But when the management's need for information refers to a concept of profit as defined by the accrual accounting system it has to be a profit after the proper deduction of interest.

By that derivation the sources of funds were not mentioned, so proved to be irrelevant for the character of interest costs. This is the same conclusion as the one reached by Anthony. The interest rate at which these costs, resp. cost dimension will be evaluated, is evidently the same as the one used in the present value computations evaluating investment projects, ultimately defined by the Capital Asset Pricing Model for the risk class of the project under consideration. To what extent that rate is depending on the equity ratio of the organization is a subject that belongs to the theory of finance. There are writers who -neglecting influences of taxation- deny such a dependence.

Commonly raised arguments concerning the difficulties to calculate the proper value of this interest rate are valid, but will never allow for the conclusion that the proper interest rate in cost calculations is the risk-free rate or some fancy rate at which a company is provided for capital by the holding to which it belongs. Educated guesses, consistently in nature, do serve the information need of management much better than evidently wrong values do.

4. THE ORGANIZATION AS A WHOLE

To complete our view on costs we have to look at the organizational activities which interlace all the projects.

These activities cause cash outlays in the same way as projects do and this negative cash flow can be transformed into 'costs' by arithmetic quite analogous to that used for the projects' cash outlays. In accounting theory there is a tendency to carry over all costs of the organization upon the cost bearing products sold by the organization. This reflects the assumption that the organization is just an asset to provide the market with these products. But the opposite view might deserve attention too: the projects are means to maintain the organization's continuity.

That implies that "Organization costs" is in the management's view a destination which absorbs costs in nearly the same way as products do. Instead of full cost accounting, which forces the accounting system to make pseudo-causal arithmetic, we can imagine a kind of restricted full cost accounting, where the restrictions are given by the extent

to which causality in product-cost relations could be defended. Using the organizational terms of Mintzberg [1983] the restricted full cost system carries the primary costs of the Core to the products, as well as costs of non-Core departments in so far these costs are related to traceable services of these departments to the Core. The remaining costs of non-Core departments are transferred to 'Organizational Costs'. The margin between product revenues and cost of goods sold has to be large enough to permit the organization to make these organizational costs, without bothering which product carries to what extent these "overheads". This can be illustrated by the following scheme:

Revenues of project i during period t
Costs of project i during period t

Operating margin of project i during period t

Aggregation over projects ---> Operating margin period t
Organizational costs period t

Organization profit period t

When needed this scheme could be extended by grouping of projects into divisions and a corresponding split up of organizational costs into divisional costs and -on the next higher level- general overhead.

It is the management's responsibility to keep the overhead costs at the level needed by the organization in the way they want the organization to operate, taking into regard the earning capacity of the market activities for recovering these costs. Hence the accounting system has to present as explicitly as possible these costs specified to causes. This could be performed by an activity-allocation procedure, illustrated in table 1:

Table 1: Costallocation to activities

	TM	MM	TC	SS	Core	Org.C	Products
Primary Costs	C1	C2	C3	C4	C5	-	C7
Topmanagment	-	-	-	-	-	T16	-
Middle manag.	T21	-	-	-	T25	T26	-
Technocracy	T31	T32	-	T34	T35	T36	-
Supp.Services	T41	T42	T43	-	T45	T46	-
Core	-	-	-	-	-	-	T57
Total	X1	X2	X3	X4	X5	TOC	TPC

Given the Ci-values and the relative t(i,j)-values, specifying the proportion of its total costs Xi which department[1] i has to transfer to department j, j = 1,....5, or costabsorption j, for j = 6 or 7, the Xi-values are defined by

$$(3.1)\quad Xi = Ci + \sum_{j=1}^{4} t(i,j).Xj \quad \text{for } i = 1,...,4$$

which enables us to solve these Xi-values. The value of X5 can be easily found by adding together C5 and the t(i,5).Xi-values for i = 1,...,4.

The t(i,j)-values have, for j = 1,...,5 , to correspond with definable services, wanted by department j. In that way the Ti6-values are the organizationcosts, allocated to source of organizational activities. Concerning the X4-value can be remarked that this could be transformed into a kind of 'price' by dividing it by the amount of services rendered, thus enabling a comparison with external prices (not on short term !) to get a slight idea about cost effectiveness of the supporting service department. But the amount of services itself, the volume component of these costs, can only be justified by the topmanagement.

This brings us back to the concept of profit on projects. Either all the organizational costs are allocated to projects, or the present value of a project has to be definitely positive in order to keep the organization going. Some writers, e.g. Meyboom [1987], propose an increase in the discounting rate in order to take into account the margin needed for recovering the organizational costs. This may be acceptable in the decion making procedure, but in the present author's opinion it is not advisable in cost accounting when the allocation of costs has to point to the activities causing these costs.

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[1] Where in table 1 and the subsequent formulas 'departments' are mentioned, it is clear that these denote a whole sector of the organization. In reality the accounting system has to describe the corresponding costflows in much greater detail.

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