

*Marcell Schweitzer**

**SEPARATION THEOREMS AS A THEORETICAL BASIS
OF THE RELATIONS BETWEEN CALCULATORIAL (INTERNAL)
AND PAGATORICAL (EXTERNAL) INCOME STATEMENT
AND CONTROLLING**

1. THE TOPIC OF THE LECTURE

In my lecture, I shall be examining the significance of separation theorems for the design (separation/integration) of accounting within the firm. My analysis will concentrate on the (internal) calculational income statement (cost accounting), the (external) pagatorial income statement (profit and loss accounting), and controlling. For my analysis I shall select several approaches that permit consideration of the separation problem from different perspectives.

To my regret, at the commencement of my analysis I find myself in the situation that all the approaches I would like to analyse treat separation theorems differently, and thus also arrive at differing proposals as to the design of the accounting system and its subsystems. This starting position is satisfactory neither from the point of view of the theory nor the design of accounting. Nevertheless, I shall attempt to arrive at a proposal for a method of design, in particular for the design of the cost accounting, which is both theoretically substantiated and practicable.

Since accounting serves, apart from purposes of documentation, also to support management decisions, I select decision theory as the basis of my analysis, making the decision field within the firm the basis of the examination. By means of this methodical approach, I wish to establish whether the errors, misinterpretations and misunderstandings that have arisen so far can be explained, and whether new insights can be opened up for the design of accounting systems and controlling.

* Prof. Dr., Eberhard-Karls-Universität, Tübingen (Germany).

At this point, I would already like to observe that the separation/integration discussion alluded to is a particularly German concern that has so far awakened only slight interest in scholarly research in other countries. The reason for this may be that the separation of the accounting system into a calculational (internal) and a pagatorial (external) accounting is regarded as an originally German concern, which is traced back to the development of accounting in Germany since the beginning of the last century. This view is, however, meanwhile refuted by the fact that internal accounting is practised together with external in numerous other countries too. At the same time, the question of the design of accounting has been pursued with special emphasis in Germany for some years. Furthermore, the adaptation of controlling from the USA raises additional aspects of the design of accounting.

2. CHARACTERISTICS OF THE SEPARATION OF DECISION FIELDS

In terms of decision theory, the setting up of a separate calculational income statement together with the pagatorial income statement presupposes a useful separation of the complex decision field of the firm. Since a decision field consists of one or more objective functions and an activity field that is valued by the objective function(s), its separation means both a separation of the objective function(s) and a separation of the activity field. As a rule, in analyses based on decision theory, one proceeds from a limited and separable decision field with one sole objective function. In reality these assumptions are not always correct, but they do provide initial insights into the separation problems to be dealt with. In reality, the decision field is also frequently fraught with various risks.

In a liberal economic system, the complex decision field of the independent firm is taken as the starting of the analysis of separation. Such a firm operates on its own responsibility, that is, it makes its decisions concerning objectives, potentials, programmes and processes largely independently, under consideration of numerous conditions, and it bears the risks which its actions involve. As the decision processes in firms are divided among the various levels of management, it follows that the decision field must be split up (separated) into partial decision fields with a minimum of infringement on the interdependences that arise.

The separation of a decision field can be carried out according to various decision subjects both horizontally (e.g. according to internal or external addressees) and vertically (e.g. according to upper, middle, and lower management levels, or according to strategic, tactical, or operative

planning levels). This separation is carried out until the resulting partial decision fields coincide with the organizational distribution of tasks and competences at the management and planning levels (Schweitzer 2003, p. 445). The accounting system, which supports numerous decision processes, must provide all responsible managers with information relevant to their decisions. The decision relevance of the information should not only have a plausible reference to the problem, but additionally the property of coordinating each partial decision with all other partial decisions in such a way that they make as great a contribution as possible to the optimum solution of the overall decision of the firm with regard to its objectives. This requirement is made of the differentiated information of the whole accounting system, whether it be an internal or external partial system of accounting, a coordinating cross-sectional accounting (e.g. controlling), or a special accounting (e.g. calculation of opportunity costs for production bottlenecks). The tasks of the provision of information and the coordination of decisions, including the development of the required instruments for information and coordination and the advising of the managers are performed by controlling.

A separation of the decision field takes place on two levels:

1. the factual subject level (level of goods and problems), and
2. the formal value level (level of objectives or calculation).

According to what decision problems on the subject level are to be supported, the decision field must be separated in a decision-specific (subject-specific) manner. If on the one hand there are internally oriented decisions related to investment, procurement and production, and on the other externally oriented decisions related to earnings available for distribution, financing and liquidity, on the subject level a separation for both groups of addressees must be made into an internally orientated group of problems and an externally orientated group of problems. In analogy to this, on the value level the accounting measure of the objective function must be separated for two submeasures. These two submeasures are to map the two groups of problems realistically. The (monetary) values used for the two submeasures should be such that one submeasure can be transferred (transformed) into the other. At least, it must be determined under what conditions the two submeasures are equivalent. This guarantees that decisions on the basis of the internal submeasure are coordinated in terms of accounting with the decisions on the basis of the external submeasure towards the achievement of the overall objective(s) of the firm.

The external subsystem uses as accounting measures input and output; on the other hand, the internal subsystem uses sales and costs. Both subsystems are income statements. The external statement is the comprehensive pagatorial income statement (profit and loss accounting), while the

internal statement represents the narrower calculational income statement (cost accounting). In order to constitute both income statements on a solid basis, on the subject level a factual (e.g. organizational) separation is required, and on the value level a formal (e.g. mathematical) separation. Separations of the decision field cannot be carried out arbitrarily. Instead, for the delimitation of partial decision fields and appropriate partial accounting systems, precise theorems, rules or principles are required that indicate under what conditions (assumptions) these separations are permissible, without infringing the superior objective function.

3. THE BASIC IDEA OF THE LÜCKE THEOREM

For the separation of the accounting system into calculational and pagatorial accounting, firstly a formal separation theorem is required to regulate the relations between the accounting measures used in the two kinds of accounting. A theorem of this kind was formulated roughly by Gabriel A. D. Preinreich (1937, p. 209), and precisely by Wolfgang Lücke (1955, p. 310). For this reason, it bears the name "Preinreich/Lücke theorem". In the following, I will refer to it briefly as the "Lücke theorem".

Allow me to describe the Lücke theorem with suitable brevity, since it recurs throughout my lecture. This shows its special importance for the design of the accounting system. Later on, I will show how further factual separations must be carried out in order to arrive at a comprehensive design of the cost accounting system.

The designation "Lücke theorem" is applied to a statement that W. Lücke formulated in connection with the valuation of investment alternatives (e.g. machines) at net present values. In answer to the question whether this valuation should be made on a pagatorial or a calculational basis, W. Lücke demonstrates formally (mathematically) that under certain assumptions the net present value of calculational partial income (sales less costs) of a planning period is equivalent to the net present value of the pagatorial payment surplus (income-effective inpay less outpay, or earnings less expense). Inasfar as these conditions apply, it is of no consequence whether the investment alternatives are evaluated calculatorically or pagatorially. In this case, the preference of the alternatives is not affected by the different valuation approach. However, as I already said, this statement applies only under certain conditions, as follows:

1. Interest on the basis of the book values of the assets at the beginning of each partial period and of the settled capital cost rate (interest rate) must be added to all calculational partial income.

2. The sum of the costs allocated in the partial income must be as high as the sum of the outpay taking effect on income. And the sum of the sales allocated in partial income must correspond to the sum of the inpay taking effect on income.

3. The difference between the acquisition value and the residual selling value of an investment must be equal to the sum of the depreciation made. The depreciation method can be individually selected. The depreciation plan of the calculational accounting can thus differ from the depreciation plan of the pagatorical accounting.

On closer examination, it appears that the Lücke theorem, which was formulated for investments on the basis of the net present value formula, gives only formal (mathematical) conditions for the equivalence between pagatorical and calculational values. That is to say: only under the conditions named is the pagatorical accounting measure equivalent to the calculational accounting measure, and only under these conditions can a formal separation into two accounting measures be made. On the other hand, the Lücke theorem, as a formal separation theorem, says nothing about whether a calculational income statement should be established beside the pagatorical. In order to answer this accounting question, it must be clarified whether the decision processes of management from factual viewpoints make necessary further separations of the decision field (or, more precisely, separations of the activity field) on the subject level. If, however, this question is answered affirmatively as to the aspects of organizational division of labour, of department-capacity, and of complexity of the decision field, the theoretical foundation for setting up a calculational income statement as well as a pagatorical one is given from both a formal and a factual perspective.

It is to be noted that the factual separation of the activity field is also subject to certain conditions, among which are to be named:

1. The complex activity field of the firm must be able to be separated factually into partial fields.

2. For each separation of the activity field, a factual criterion must be formulated.

3. The nature and extent of a separation depend on the need for information and on the structure of the decision processes of the management.

4. The separation of an activity field may only be carried out with a minimum of infringement of existing relations between the partial activity fields.

5. Where the separation of a partial activity field cannot be continued, for technical, organizational, legal or other reasons of coupling, no fictive separation principles may be introduced as a remedy.

6. All consequences, disturbances or adaptations in the partial activity field resulting from separation must be known.

7. The partial activity fields formed by separation may raise neither new quality problems nor bottleneck questions.

8. Every separation must be capable of revision.

As an interim conclusion, I therefore state:

The distinction between formal and factual separation conditions shows that the intention of the Lücke theorem is not to map as precisely as possible a real decision situation in the firm, nor to give reasons for the setting up of a separate calculational income statement (cost accounting), but to create an abstract formal (mathematical) relation between the accounting measures of well-defined income and payment. Put differently, the Lücke theorem explains under what conditions a transformation from pagatorical values to calculational ones can purely formally be carried out. The question whether, for all real decision problems that are delimited by factual separations, separate accounting subsystems are to be conceived, or the question whether the integration of the calculational income statement in the pagatorical (or vice versa) is permissible, are not answered by the Lücke theorem, but only by adducing further factual separations on the basis of decision processes.

4. APPROACHES TO SEPARATION/INTEGRATION OF THE CALCULATORICAL AND THE PAGATORICAL INCOME STATEMENT

4.1. An investment-theory approach

For Josef Kloock, the Lücke theorem is central to the analysis of relations between pagatorical and calculational income statements. From the perspective of investment theory, J. Kloock (1997, p. 68) shows:

1) what formal requirements are to be made, according to this theorem, of the delimitation between the pagatorical and the calculational income statement;

2) which insights this theorem provides into earnings and expenses connected with the valuation of an enterprise;

3) how, according to this theorem, uncertainties or risks of the payments are linked with uncertainties or risks of the income statement;

4) the problems which this theorem reveals in the disaggregation (separation) of the accounting measures from the tactical to the operative planning level.

For extensions of the Lücke theorem, I refer to J. Kloock (1981, p. 878 and 1997, p. 68), particularly the formal demonstration that the income statement according to commercial law (profit and loss accounting) (including a calculational calculation of interest) can also provide relevant information for investment accounting (Kloock 1981, p. 883.).

In the approach of J. Kloock, the separation between the calculational and pagatorial income statements appears from an investment-theory perspective according to (1) as follows (Kloock 1997, p. 68):

– First, J. Kloock defeats of the misunderstanding that the Lücke theorem pursues the aim “of carrying out investment accounting, instead of using payments, using a different monetary basis accounting system” (Kloock 1997, 70). Instead, he states, the main purpose of this theorem is to explain under what conditions the calculational measures (costs, sales) have a non-contradictory relation to the pagatorial measures (inpay, outpay); here, the concept of income used is based on the net present value of the investment analysis, so that the investment analysis is to be seen as the basis of both measures (Kloock 1981, p. 873.).

– The Lücke theorem creates the formal relation for a calculational income statement by which, for decisions on the operational planning level, the achievement of the positive net present value in the investment plan is secured on the tactical planning level simultaneously.

– The Lücke theorem provides formal support for the allocation of interest costs in the calculational income statement (based on the withholding capital). Additionally, for special different individual decisions there follow from this theorem the inclusion of further calculational costs and the taking into account of residual selling value (Kloock 1997, p. 68–69).

– Contrariwise, a planned income statement on the basis of the Lücke theorem provides information relevant to investment decisions made in advance.

– For the controlling (not only in investment centres, as H. Hax claims: cf. section 4.4) of investments that were carried out before the planning point in time $t = 0$, the Lücke theorem formally provides the theoretical basis, inasfar as the target income and actual income of the investment are oriented to the net present value of the investment.

I would like to point out that J. Kloock in his approach argues purely formally on the value level of the decision field. The distinction between formal separation on the value level and factual separation on the subject level is not made explicitly by J. Kloock. Moreover an integration of the operational calculational income statement into a tactical investment statement on the basis of the net present value raises several interface problems, which are systematically analysed by St. Dierkes and J. Kloock (2000, p. 119).

4.2. An agency-oriented approach

I proceed from the assumption that the calculational income statement (cost accounting) traces the accounting objectives: 1) mapping and documentation of the firm process, 2) planning and control of the firm process, and (3) behaviour steering of the employees (Schweitzer, Ziolkowski 1999, p. 15; Schweitzer, Küpper 2003, p. 26). Behaviour steering of the employees arouses the special interest of the agency-oriented approach for the design of the calculational income statement (Schweitzer 2002, col. 2026). The reason for this is that conflicts of interests and objectives as well as asymmetrical allocations of information between individual managers occur (Beaver 1998, p. 28). This also applies to the external addressees of the accounting system. To the solution of conflicts of objectives between the external addressees, balance sheet accounting contributes by means of information which is in accordance with legal prescriptions or special contractual agreements. The question thus suggests itself whether balance sheet accounting, as a legally normed system of accounting, is able to provide suitable information for the solution of internal objective conflicts.

Internally, management has to make numerous individual decisions regarding potentials, programmes and processes that must be supported by problem-specific and decision-relevant information. Since the pagatorial income statement is not able to provide this accounting information, a calculational income statement is required whose task, among other things, it is to procure the required decision-relevant information for management. Especially the deriving of opportunity costs for the evaluation of decision alternatives is held to be an important task of the calculational income statement (Pfaff 1994, p. 1065). Opportunity costs can, for one thing, be lost profits and on the other price differences between acquisition costs and other values, which are allocated depending on objectives. In calculating opportunity costs, however, approximate values are said to be sufficient. In any case a concept of cost in terms of value is applied for the calculational income statement. Besides, for the making of internal decisions it is important to map the production process precisely and in detail. Since a pagatorial income statement is able neither to provide a detailed description of the production process, nor to calculate objective- and situation-dependent opportunity costs, a calculational income statement, which is able to fulfil precisely these requirements, is said to be indispensable for the support of management decisions.

After considering the arguments that speak for a separation of the two kinds of income statement (income-, risk- or evaluation couples, couples

between individual departments and relations of interdependence) and arguments **against** a separation (cost savings, application of the residual profit approach), D. Pfaff finally arrives at the recommendation to retain a separate calculational income statement (cost accounting) together with a pagatorical income statement (profit and loss accounting). As an additional reason for this recommendation, he carries out an analysis of possible consequences of couple effects, which make visible certain cost-calculating problems of the allocation of fixed and overhead costs. An allocation of such "couple costs" is, he states, a proven instrument of behaviour steering. Flexible transfer prices for intercompany output, too, can, he states, be provided only by a suitably developed calculational income statement. A comparable argumentation is presented for the calculation of various transfer prices.

4.3. An approach based on the capital market

A further contribution to the discussion of the separation/integration of income statements is the capital-market-based approach. This approach (Küpper 1985, p. 26; 1990, p. 253; 1995, p. 19) has recourse to the mapping of the firm process by long-term estimates of payments (for a fundamental critique of this approach, cf. Koch 1999, p. 200). The accounting objectives pursued here, in agreement with traditional cost accounting, are the mapping and documentation of the firm process, the planning and control of the firm process, and the behaviour steering of the employees. Strategically, this approach is oriented to the value of the equity capital on the capital market (market value of the equity capital = market value of the firm less market value of the outside capital = shareholder value). From this perspective, the overall firm accounting system, thus including the calculational income statement, becomes the instrument of capital-market-dependent evaluation and steering of the management. The central problem then is to design the calculational income statement in such a way that it is tailored to the present and future interests and objectives of the managers and the shareholders. Such a design of the calculational income statement only succeeds when the superior income objective function is known, which is at least equivalent to the interests and objectives of the managers and the shareholders, and when the future payment series can be precisely forecast.

From the perspective of accounting based on the capital market, on the **strategic-tactical level** income-potential statements, project budgets and project controlling instruments can be developed. On the **operational level**, on the

other hand, planning and control instruments for processes and steering instruments for employee behaviour are to be provided (K ü p p e r 1990, p. 253). In order to achieve a strategic orientation of the overall firm accounting from the capital market value of the equity capital, procedures are required by which the capital-market value of the equity capital can be forecast. One possible point of connection is the net cash-flow (Schweitzer 2002, col. 2027). To forecast the capital-market value of the equity capital, which is to be the measure of the total income potential of the firm, for instance in a divisionalized firm (B r e i d 1994, p. 26), departments of central administration, finance and product divisions can be separated. It is the net cash flow of these three areas that determines the market value of the firm. The basic control measure for the three areas is a risk-free calculation interest, which is modified by area-specific corrections. A further differentiation of these corrections can be made, depending on strategy, by means of which an optimum strategic allocation of financing to the areas concerned is to be achieved.

An accounting of income potential of the kind described can only be formulated on the assumption of a considerable number of conditions. Among these are (Schweitzer 2001, p. 165):

- All qualitative features of strategic measures are excluded.
- Payment effects of strategic measures represent largely subjective estimates.
- The analysis applies to divisionalized firms that can without difficulty be factually separated into the partial fields of central administration, finance and product divisions.
- Each of these three partial fields draws up a separate financial budget covering several periods.
- The number of problem areas to be taken account of is limited.
- The divisions operate complete financing from own resources.
- Requisite inpay and outpay can be estimated subjectively with sufficient precision, and are subject to uncertain expectations, which are approximated by beta-distribution functions.

Strategic measures can lead to various effects. Some of these effects can be mapped by inpay and outpay. Others (especially qualitative effects) are not mapped by payments (e.g. learning effects, flexibility effects, cultural effects of an internationalisation, etc (Schweitzer 2004, p. 84). Since the income-potential accounting proceeds from the measurable flows of payment and considers these alone as accounting measures, it ignores several components of strategic measure effects. It is thus, as a result of its conception, a quantitative partial accounting. Despite this, it shows roughly the basic structure and the design problems of factually separated firm accounting

that claims to orient tactical and operational accounting to strategy-dependent income-potential accounting. Even if, because of its assumptions and separations, it is still far from the reality of strategic business of the firm, its fruitfulness lies in bringing about a strategy-consciousness, in a strategic orientation of all the managers, and in the revelation of structures of strategically oriented accounting.

In as far as firm accounting on the strategic and tactical level takes the capital market as a basis, this means, for the operational calculational income statement, an adjustment of costs and income based on the capital market. In general, this adjustment can take place in various ways: In the framework of income-potential accounting, after a critical appreciation of the Lücke theorem, H.-U. Küpper (1985, p. 26 ff.) chooses the basis of the capital market, as this approach explicitly proceeds from payments and permits a simple subordination of accounting to a multi-period objective. In particular, this payment-oriented approach avoids complicated period accruals of input in operational accounting (cost accounting), whose potentials are tied in the firm in the long term (e.g. depreciation). In this way, management is to be provided with a constant orientation of its decisions with relation to the superior capital market objective. However the calculational income statement is adjusted to payments, the designation "cost accounting" is not to be abandoned.

4.4. An approach based on decision theory

The fourth contribution to the design of an accounting system that I wish to analyse is that based on decision theory. Here, accounting theory is interested in the question whether an income measurement on the basis of the concept of cost and sales in terms of value can be supported in terms of decision theory by a separation theorem (Hax 2002, col. 758). This poses the question of the justification of the calculational income statement from the perspective of decision theory.

To begin with, H. Hax admits that on the one hand there are two arguments for separating the calculational income statement from the pagatorial:

1. It may be desirable to measure the narrower operating income of the production and distribution area of a firm separately from the non-operating income of the remaining area.

2. It is also clearly necessary to avoid information distortions of the pagatorial income statement which arise, for instance, through taxation or

other manipulations of evaluation, finding their way into the calculational income statement.

According to H. Hax, on the other hand, it is a serious point that a separation of the calculational income statement demands separation from the payments of the pagatorial commercial income statement, and permits the use of the "value-based" concept of costs and income. This, according to him, introduces payment-neutral elements in the form of calculational costs into the cost accounting system thus departing from the payment basis of the pagatorial income statement. The introduction of a concept of "pagatorial cost" following Helmut Koch is not, according to H. Hax, the solution of the problem either. As long as it is not clearly established according to what rules the operating input and output are to be evaluated, the value-based concept of costs and income remains, according to him, empty of content. Without the derivation of situation-conditioned values from a theoretical conception, he says, the evaluation leads to complete indetermination.

In H. Hax's view, the central theoretical question of the calculational income statement is under what conditions it is permissible at all to base decisions in the firm on costs and sales (Hax 2002, col. 761). To put the question differently: under what conditions can partial decision fields be separated from the firm decision field in such a way that the manager, in his separated area of competence, can make optimum decisions on the basis of area-relevant costs and sales (cf. on this also Schweitzer, Ziolkowski 1999, p. 80). In answer to this question, a correspondingly powerful separation theorem must be formulated. To answer this question, H. Hax has recourse to the already known separation theorem of the theory of investment and financing, which states under what conditions "the optimization of the payment flow can be detached from the context of subjective preferences and achieved via the maximization of a monetary substitute measure, net present value, understood as capital market value" (Hax 2002, col. 762). However, according to H. Hax, this first **separation theorem** is not sufficient. For the theoretical basis of an independent calculational income statement, a second **separation theorem** is required. This must state under which conditions a decision based on costs and sales in a separated partial decision field (e.g. for the production programme planning) leads precisely to the fulfilment of the superior objective "maximization of market value", and thus as a result simultaneously to the "optimization of the superior payment flow".

Now, the second separation problem is by no means new. E. Schmalenbach already clearly recognised this problem in formulating his "Kalkulationswerte" and later when formulating his "optimale Geltungszahl" (1947;

1948) (cf. also Hax 2002, col. 762 f.). He formulated it as a microeconomic "Verrechnungspreistheorem" (transfer price theorem). E. Schmalenbach even intended to extend this theorem from microeconomic to macroeconomic processes, which age prevented him from doing. At any rate, this theorem was later fully confirmed by the "dual price theorem" of linear and non-linear programming. However, the calculation of the duals can only take place simultaneously with the solution of the primal decision problem. In organizational terms, therefore, the centralized primal problem must be assumed as solved for the decentralized application of transfer prices (duals; shadow prices). This means that a separation and decentralization of decisions on a large scale leads nowhere. Only for a few minor special cases has it been possible, with considerable calculational effort, to bring this separation in the proximity of practical application. To H. Hax, it is the more remarkable that the concept of costs and sales in terms of value, which is based on the same theoretical basis as the dual price theorem, has been put so successfully into practical application, although having hardly been questioned on a theoretical level. If the requirement of practical use to avoid complexity in accounting as far as possible is taken account of, he says, the new tendency becomes understandable "[...] for cost accounting once more to approach the pagatorical basis, and thus to integrate it more closely into an overall system of accounting [...]" (Hax 2002, col. 764). How this is to be done in concrete terms remains, however, open.

However, H. Hax sees an exception to his criticism: as an instrument of control of income in investment centres, he grants the calculational income statement some importance, because here, with a given interest rate, the requisite separation is possible without difficulty. Since capital investments play a special part in investment centres, the decentralized investment decisions can be controlled by means of transfer price (fixed interest rate for the invested capital). It can be shown that the connected income control can be effectively realised by cost-based supervision, by adducing the Lücke theorem, as J. Kloock demonstrated earlier. According to H. Hax, for the calculational income statement there results the consequence that with the exception of the calculational interest, to which however great importance is attached, "[...] it must be strictly pagatorically oriented. This applies above all to depreciation" (Hax 2002, col. 765). The income concept presupposed from the control of the investment centre is the residual income (economic value added (EVA)). For the controlling of income of investment centres by means of residual income, therefore, a reduced calculational income statement is required, also for the avoidance of all distortions of information that flow from the tax balance sheet via commercial balance sheet into the calculational income Statement v.

5. CONCLUSIONS FOR THE DESIGN OF THE ACCOUNTING SYSTEM

5.1. An assessment of the approaches analysed

As the result of my analysis, I may state that, for internal decision processes of management, an internal calculational income statement (cost accounting) can be recommended in addition to the external pagatorial income statement (profit and loss accounting) with an adequate basis in theory.

From my analysis of the presented approaches to the separation/integration of accounting, however, there result various dimensions and contents of the calculational income statement. This situation calls for a critical appreciation of the approaches, and for a constructive proposal for the design of the accounting system. With due brevity, I would like to do both here:

– In the approaches analysed, the significance of the Lücke theorem as theoretical basis for the formal relations between the two kinds of income statement is variously estimated.

– In none of the approaches is the methodically fruitful distinction between formal separation on the value level and factual separation on the subject level explicitly made.

– In the approach based on investment theory (Kloock), the Lücke theorem occupies a central position as a theoretical basis of the formal transformation of payments into pagatorial and calculational income. Here, in contrast to other approaches, it is shown that this theorem provides the theoretical foundation for formal separations not only for the calculational income statement, but also for other monetary basis-accounting systems and their variants (e.g. firm evaluations, investment controlling, strategic decisions etc.) (Kloock 1997, p. 69 f., 90, 104, 108). But factual separations are only implicitly carried out; non-monetary separations are not discussed.

– In the agency-oriented approach (Pfaff), although several formal and factual separations are carried out, they are not explicitly termed as such, which applies in particular to the Lücke theorem. The reason for this is to be found in a different methodical procedure. According to D. Pfaff, production processes are adequately mapped by means of the calculational income statement. However, decision problems are included in this accounting (e.g. calculation of opportunity costs) that do not belong there. Non-monetary separations are not mentioned. The theoretical foundation of the whole approach is thus relatively weak.

– In the approach based on the capital market (Küpper), the Lücke theorem is sharply criticised and dismissed as of no use for the requisite

value transformations. This criticism is not appropriate, as the Lücke theorem is here wrongly interpreted. It is overlooked that precisely in this approach the Lücke theorem is required for formal value separations, as J. Kloock convincingly demonstrates. Factual separations are carried out, but are based largely on unrealistic assumptions. Non-monetary separations are not discussed. The demand for integration of the calculational income statement into profit and loss accounting based on the capital market, and the aligning of the overall accounting of the firm with the value of the equity capital on the capital market is one-sidedly oriented to the interests of the shareholders.

– In the approach based on decision theory (Hax), the Lücke theorem is reduced to the formal value transformation for the control of income in investment centres. Although this is thinkable, it overlooks all the other possible applications of the theorem, which J. Kloock has comprehensively described and formally substantiated. Factual separations are implicitly carried out by H. Hax, but not indicated as such. Non-monetary separations are not discussed. On the other hand, decision problems are attributed to the calculational income statement (e.g. pretiale Lenkung) which do not belong to a traditional determination statement, but a separate. The demand for a large degree of integration of the calculational income statement into the pagatorical income statement is therefore overall very weakly supported.

5.2. Proposal for the design of income statements

1. Firms are very largely free in their choice of objectives. The practice of management shows that numerous firms (Schweitzer 2002, col. 2028)

– choose quite different objectives from those hitherto discussed (e.g. sales, contribution, value added, market shares),

– mostly pursue several objectives simultaneously in their system of objectives (e.g. economic, technological, ecological, social objectives),

– pursue totally different objectives in different fields within one and the same firm (e.g. in the field of research and development, innovation and quality control, sales market, for the firm as a whole) which are not supported by a formal separation,

– for the most part are not participants in the capital market, and therefore do not take maximization of the value of their equity capital in the capital market as their objective function,

– do not pursue maximization or minimization of their objective functions, but a freely chosen satisfaction.

2. Non-profit enterprises such as public hospitals, state universities, forestry authorities, economic enterprises of local authorities, etc., pursue objectives quite different from those based on investment theory or the capital market. Therefore their calculational income statements require a different kind of theoretical basis from the calculational income statements of a globally active industrial concern with SEC-listed (Securities and Exchange Commission-listed) shares.

3. The approaches analysed deal with the theoretical basis of accounting in the firm only from the perspective of monetary basic-measures. In all of them it is only indicated very roughly what design, up to a practicable accounting system, they should take.

4. Only a vague perspective results of the consequences that might result from an integration of the calculational income statement into the pagatorical, if only for the design of the profit and loss account according to commercial law. The reason for this is that the profit and loss account, also according to IAS (International Accounting Standards) and US-GAAP (US-Generally Accepted Accounting Principles), is largely legally determined, and thus relatively inflexible in terms of accounting design.

5. If, in future, in addition to pagatorical income statement, a calculational income statement of a new kind were to be envisaged as a second operational kind of internal accounting covering a category-, a centre- and a unit-accounting, an internal cost allocation, etc. it would be more correct to term this accounting system from the outset as "pagatorical cost accounting".

6. If one has recourse to the data-processing instrument of the relational data bank, all calculational costs can be removed from the basic statement and thus a purely calculational determination accounting set up. This accounting would be a data bank for all following decision-oriented calculations that can be carried out in banks of algorithms and objectives (Schweitzer 2001, p. 191). In the bank of algorithms and objectives, various controlling ratios (Schweitzer 2003, p. 429), calculational costs, opportunity costs, cash flows and net present values could be calculated. Furthermore, made-to-measure, isolated and simultaneous decision models, forecasting models, budgets *etc.* could be formulated as operational management accounting for each firm and their results be made available to controlling. Setting up and maintaining these data-, algorithm- and objective-banks, and advising management, would be the primary tasks of a decision-oriented controlling.

5.3. Conclusions for the design of controlling

This brings me to the final part of my analysis, which refers to the "controlling" of the firm:

1. Controlling, with its instruments business ratios, budgeting, and cost accounting, is largely built on the monetary data of the accounting system. Therefore, all the represented separations of accounting also form the theoretical basis of controlling.

2. Controlling, however, with its function of information and coordination of management decisions (or decision processes) goes beyond monetary accounting, and also supports non-monetary planning and control (for instance supported by balanced scorecards). This applies to product design decisions, time decisions, and quality (of goods and staff) decisions (Schweitzer 2003, p. 440 and 2004, p. 84). For the measures of the connected (non-monetary) objective functions, other formal separations must be made from those treated by the (monetary) Lücke theorem.

3. In principle, the Lücke theorem covers the theoretical support of the accounting measure between the tactical planning level (investment accounting) and the operational planning level (cost accounting). The extension of this theorem from the tactical to the strategic planning level by including cash flow is relatively unproblematic. Thus, the separation of the accounting measure in terms of the planning hierarchy is assured, and the monetary strategic, tactical and operational controlling is based by accounting theory.

4. The Lücke theorem also covers the theoretical basis of the accounting measure for decisions at top management level, middle management level and processing level. This also secures the separation of the accounting measure in terms of the management hierarchy and provides a basis for monetary controlling for various levels of management in terms of the theory of accounting. The only problems that arise here are the coordination of the decision competences with the controlling information, and the aggregation of the controlling data from one management level to another (Schweitzer 2003, p. 444). However, these are problems of data aggregation and controlling organisation.

5. Monetary and non-monetary controlling instruments currently work predominantly with result supervision (plan-actual-comparison). Differentiations in relation to both the planning hierarchy and the management hierarchy, and the further extensions of controlling, however, require to be expanded by additional forms of supervision (Schweitzer, Ziolkowski 1999, p. 17; Schweitzer 2001, p. 182–183 and 2004, p. 87). These are, in detail:

- supervision of planning progress (plan-prediction comparison),
- supervision of objectives (plan-plan comparison),
- supervision of premisses (prediction-actual comparison),
- supervision of forecast (prediction-prediction comparison).

6. CONCLUDING REMARKS

To sum up, I should like to make the following statements concerning the significance of separation theorems and separations for the design of income statements and controlling:

1. In the operational field, a cost accounting system is indispensable. Its design can follow the sketched relational data-bank concept.

2. The formal relation of equivalence between pagatorical and calculational income statement can be theoretically based via the Lücke theorem and its extensions.

3. By means of a consistent formulation and application of formal separation theorems and factual separations, it is ensured that cost accounting and controlling provide decision-relevant information for numerous internal decision problems.

4. One of the important tasks of controlling is to elaborate, test, implement and maintain the (new) cost accounting system in a firm-specific (made-to-measure) manner. With the aid of the relevant information derived, all decisions of management can be coordinated on the superior objective system of the firm.

5. Together with several insights as to the design of the cost accounting system, as the conclusion of my analysis it also becomes clear that, although with formal and factual separations we are on the right track in the theoretical foundation of cost accounting and of controlling, further empirical research needs to be undertaken.

REFERENCES

- Beaver W. H. (1998), *Financial Reporting: An Accounting Revolution*, 3rd Ed., Englewood Cliffs (NJ).
- Breid V. (1994), *Erfolgspotentialrechnung – Konzeption im System einer finanztheoretisch fundierten, strategischen Erfolgsrechnung*, Stuttgart.
- Dierkes St., Kloock J. (2000), *Integration von Investitionsrechnung und kalkulatorischer Erfolgsrechnung*, „Kostenrechnungspraxis“ [krp], p. 119–131.
- Hax H. (2002), *Integration externer und interner Unternehmensrechnung*, [in:] *Handwörterbuch Unternehmensrechnung und controlling*, Hrsg. H.-U. von Küpper, A. Wagenhofer, 4. Aufl., Stuttgart, p. 758–767.

- Kloock J. (1981), *Mehrperiodige Investitionsrechnungen auf der Basis kalkulatorischer und handelsrechtlicher Erfolgsrechnungen*, "Zeitschrift für betriebswirtschaftliche Forschung", p. 873–890.
- Kloock J. (1997), *Betriebliches Rechnungswesen*, 2. Aufl., Köln.
- Koch H. (1999), *Zur Frage der Vereinheitlichung der Entscheidungsrechnungen: Kalkulatorische Planerfolgsrechnung oder Zahlungsrechnung*, "Zeitschrift für Betriebswirtschaft", p. 195–204.
- Küpper H.-U. (1985), *Investitionstheoretische Fundierung der Kostenrechnung*, "Zeitschrift für betriebswirtschaftliche Forschung", p. 26–48.
- Küpper H.-U. (1990), *Verknüpfung von Investitions- und Kostenrechnung als Kern einer umfassenden Planungs- und Kontrollrechnung*, "Betriebswirtschaftliche Forschung und Praxis", p. 253–267.
- Küpper H.-U. (1995), *Unternehmensplanung und steuerung mit pagatorischen oder kalkulatorischen Erfolgsrechnungen*, "Zeitschrift für betriebswirtschaftliche Forschung", Sonderheft 34, p. 19–50.
- Lücke W. (1955), *Investitionsrechnungen auf der Grundlage von Ausgaben oder Kosten?*, "Zeitschrift für handelswissenschaftliche Forschung", p. 310–324.
- Pfaff D. (1994), *Zur Notwendigkeit einer eigenständigen Kostenrechnung*, "Zeitschrift für betriebswirtschaftliche Forschung", p. 1065–1084.
- Preinreich G. A. D. (1937), *Valuation and Amortization*, "The Accounting Review", vol. 12, p. 209–226.
- Schmalenbach E. (1947), *Pretiale Wirtschaftslenkung. Band 1: Die optimale Geltungszahl*, Bremen-Horn.
- Schmalenbach E. (1948), *Pretiale Wirtschaftslenkung. Band 2: Pretiale Lenkung des Betriebes*, Bremen-Horn.
- Schweitzer M. (2001), *Die Kosten- und Erlösrechnung zwischen theoretischen Anforderungen und Rechnungswirklichkeit (Offene Fragen der internen Erfolgsrechnung)*, "Jahrbuch für Controlling und Rechnungswesen" 2001, Hrsg. G. von Seicht, Wien, p. 159–200.
- Schweitzer M. (2002), *Unternehmensrechnung, Gestaltung und Wirkungen*, [in:] *Handwörterbuch Unternehmensrechnung und Controlling*, Hrsg. H.-U. von Küpper, A. Wagenhofer, 4. Aufl., Stuttgart, p. 2017–2030.
- Schweitzer M. (2003), *Leitungsebenendifferenzierte Kennzahlen als Instrumente des Controllings*, "Betriebswirtschaftslehre und betriebliche Praxis", *Festschrift für Horst Seelbach zum 65. Geburtstag*, Hrsg. H. von Jahnke, W. Brüggemann, Wiesbaden, p. 429–454.
- Schweitzer M. (2004), *Anforderungen an das Controlling bei Dynamik und Unsicherheit des Wirtschaftens*, "Jahrbuch für Controlling und Rechnungswesen", Hrsg. G. von Seicht, Wien, p. 73–91.
- Schweitzer M., Küpper H.-U. (2003), *Systeme der Kosten- und Erlösrechnung*, 8. Aufl., München.
- Schweitzer M., Ziolkowski U. (1999), *Interne Unternehmensrechnung: aufwandsorientiert oder kalkulatorisch?*, Sonderheft 42, "Zeitschrift für betriebswirtschaftliche Forschung", Hrsg. M. von Schweitzer, U. Ziolkowski, Düsseldorf, Frankfurt/M.

Marcell Schweitzer

KONCEPCJE SEPARACJI JAKO TEORETYCZNA PODSTAWA RELACJI
MIĘDZY WEWNĘTRZNYM RACHUNKIEM KOSZTÓW I WYNIKÓW
ORAZ RACHUNKIEM ZYSKÓW I STRAT (PAGATORYCZNYM)
A *CONTROLLINGIEM*

Celem artykułu jest ocena znaczenia koncepcji separacji dla budowy systemu rachunkowości przedsiębiorstwa. Przedmiotem analizy autora jest (wewnętrzny) rachunek kosztów i wyników, pagatoryczny (zewnętrzny) rachunek zysków i strat oraz system *controllingu* przedsiębiorstwa.

Podział systemu rachunkowości jednostki gospodarczej na dwa podsystemy, tj. rachunek kosztów i wyników dla potrzeb informacyjnych kierowników jednostki oraz podsystem rachunkowości zewnętrznej, nazwany pagatorycznym rachunkiem zysków i strat, a także określenie wzajemnych relacji tych podsystemów oraz ich powiązań z systemem *controllingu* powinny zostać dokonane przy zastosowaniu zasad i procedur wskazujących, przy jakich założeniach taki podział jest dopuszczalny bez naruszenia funkcji celu.

Dążąc do wyspecyfikowania tych zasad, autor przedstawił i ocenił następujące koncepcje odnoszące się do separacji i integracji podsystemów rachunkowości:

- teoria Preinreicha-Lücke'go,
- koncepcja Kloocka oparta na teorii inwestycji,
- podejście oparte na teorii agencji,
- podejście zorientowane na rynek kapitałowy.

Końcowa część artykułu zawiera propozycje autora i wnioski ważne dla projektowania wewnętrznego rachunku kosztów i wyników, podsystemu rachunkowości finansowej (zewnętrznej) oraz systemu *controllingu* w jednostce gospodarczej.

1. Na płaszczyźnie operacyjnej system rachunku kosztów jest niezbędny. Może być zorganizowany zgodnie z koncepcją relacyjnej bazy danych.

2. Teoretyczną podbudową formalnej relacji równorzędności pagatorycznego rachunku zysków i strat oraz wewnętrznego rachunku kosztów i wyników jest teoria Lücke'go oraz koncepcje pochodne.

3. Dzięki konsekwentnemu formułowaniu i stosowaniu formalnych teorii separacji oraz rzeczywistych podziałów, rachunek kosztów i *controlling* dostarczają właściwych informacji potrzebnych do podejmowania decyzji w sprawie różnych problemów wewnętrznych.

4. Jednym z ważnych zadań *controllingu* jest opracowanie, przetestowanie, wdrożenie oraz utrzymywanie systemu rachunku kosztów dostosowanego do specyfiki firmy. Dzięki uzyskanym informacjom można koordynować wszystkie decyzje kierownictwa, uwzględniając nadrzędny cel przedsiębiorstwa.

5. Niezależnie od wyżej przedstawionych korzyści nie ulega wątpliwości, że choć jesteśmy na właściwym torze, traktując formalne i rzeczywiste podziały jako teoretyczne podstawy rachunku kosztów i *controllingu*, potrzebne są dalsze badania empiryczne w tej dziedzinie.