
Multi-Vector Accounting Concept in Modern Management

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Abstract:

The article describes the current status of accounting as a multi-vector accounting, which was initiated by the segmentation of activities. For this purpose, the segmentation in accounting was analyzed on the example of international and Russian experience; expanded management needs in systemic replication of accounting information on various grounds were justified. The need of modern management for multiplying primary information once provided for the accounting as many times as management strategy and tactics requires is argued. It is proved that the pursuit of the alternative objectives concerning various management subjects is appropriately to be provided with the help of accounts and a double entry and not by "manual" sampling of information or by local software settings.

In this connection, it is possible to assert a new status of accounting as a multi-vector system accounting, the characteristics of which are proposed by the authors of the article. In order to develop a unified approach to the multi-vector accounting organization and due to the requirement to differentiate its results for external and internal users, it is necessary to typify the multi-vector accounting under the management strategy and tactics. For this purpose, key points of the approaches to the selection of multi-vector accounting methods are highlighted, examples of management subjects as multi-vector accounting objects are given.

As a result of the research, the authors proposed the key areas of multi-vector accounting within the framework of accounting and management accounting and substantiated the possibility of expanding the accounting resource on a systematic basis. Each of these accounting vectors assumes its own set of accounting information aggregation and specific ways of calculating the key indicators that facilitate receiving targeted information for modern management strategy and tactics support on a systematic basis. Multivector accounting will allow generating each management entity's result and assessing each information segment's potential.

Keywords: *accounting, management accounting, segments, management, multi-vector accounting, accounting objects, accounting subjects, expenses, revenues, strategy and tactics of management*

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1. Research objectives and hypotheses

1.1. Objectives of the study

The purpose of this work was to study the causes and consequences of multi-vector accounting in Russian and international practice in connection with the theory of segmentation under modern management conditions. Achieving of these goals requires the solution of the following tasks:

- 1) to highlight the reasons and justify the necessity of developing a modern concept of multi-vector accounting based on economic segmentation;
- 2) to generalize the world experience of economic segmentation as a basis for multi-vector accounting;
- 3) to reveal the Russian segment accounting evolution towards multi-vector accounting;
- 4) to systematize the main components of the multi-vector accounting concept in theory and practice of modern management.

1.2. Research hypotheses

To meet the tasks the following hypotheses will be tested during the research:

H1: market economy development leads to variability of the accounting resource in the system of modern management and to different accounting vectors.

H2: the key areas of multi-vector accounting depend on accounting standardization conditions on the part the state and corporate business.

2. Literature Review

International and Russian accounting theory and practice have been replenished with new accounting technologies, accounting categories and concepts for many years. The desire for accounting statements openness on the part of investors and the state has revived interest in different approaches to accounting information formation. Standardization of accounting techniques for external reporting consumers, on the one hand, and independence in choosing accounting methods for internal users of management reporting, on the other hand, led to identifying a management accounting subsystem. Management accounting functionality developed in interrelation with internal management needs and required its own accounting theory generalization. Works of the scientific and professional community on Russian and international accounting theory and practice contributed to those needs. The introduction of methods for the formation of managerial, integrated, social, environmental reporting led to identifying the category of multi-vector accounting. Works relating to management accounting by such foreign authors as R. Vander Wiel [2], A. Deyhle [4], K. Drury [5], T. Scone [13], Horngren [16] contributed to justification of the possibility of multifunctional accounting in the modern market economy. They proved the necessity to define the accounting subsystem for management purposes, revealed essential categories of management accounting, and

also systematized the management accounting tools from the point of view of international accounting theory and practice. It encouraged such Russian authors as Averchev I.V. [1], M.A. Vakhrushina [3], V.B. Ivashkevich [6], T.P. Karpova [7], V.E. Kerimov [9], N.P. Kondrakov [10], O.E. Nikolaeva [12], A.D. Sheremet [176], etc., to develop a theory of accounting in management and to confirm the multifunctionality of accounting in management system. Studies of Russian authors have extended the boundaries of management accounting for its application in business. It was completed by works of Russian authors in accounting segmentation sphere: G.Yu. Kasyanova [10], T.V. Miroshnichenko [11], O. Skushnareva [14], A.A. Sokolov [15], E.A. Sharovatova [18], N.G. Edgulov [19] and others.

The totality of scientific research in the field of segment accounting initiated the development of multi-vector accounting. It is the interest in the multifunctionality of accounting for various management purposes that does not cause doubts in the systematization of knowledge and the definition of the concept of multi-vector accounting in modern economic conditions.

3. Research methodology

As general research tools general scientific methods such as synthesis, generalization and detailing, comparison, observation, formalization, analogy, historical, logical and systemic approaches were used to generalize the results obtained. Private methods of scientific cognition such as the method of comparison, schematic and tabular structuring of information method, forecasting were used in course of the research.

4. Results of the study

4.1. Relevance of formulating the concept of multi-vector accounting based on economic segmentation as a modern accounting technology

Russian and international accounting practices have always reacted to changes in economic relations between and within states. So, the scientific community in the field of management and accounting responded to the development of market relations in Russia by justifying the necessity of regulating accounting methods.

It is due to the desire for accounting statements data openness and confidence in matching investment in commercial technology. Russian legislation standardized key accounting techniques already at the end of the last century, which made it possible to unify accounting statements following the international accounting practice. However, establishing the law on accounting in Russia and issuing accounting standards highlighted the problem of searching for such accounting methods that go beyond the standardized accounting, which is necessary for solving various daily management tasks.

In this regard, the methods of management accounting, tax accounting, segmentation in accounting, used for preparation of accounting information for its various consumers, became of great demand. Such target reporting formats as accounting, integrated, managerial, social, etc. became standard management practice. It became possible to apply various generalizations of the same accounting information depending on the ultimate goal of its use in management. It is the market consequences of the development of Russian and international accounting practices that encouraged such a new economic category as a segment of accounting and a vector of accounting, involving generalization of the same accounting information in the context of various management subjects.

The subjects of management may include various segments in the form of areas of operational activities, local operational activity, financial responsibility centers and cost centers within the organization, cost drivers in the context of commodity groups and even manufacturing processes, product consumers relating to domestic and export market, and others. All of these areas can be organized as a vector of accounting, specific methods of generalization and evaluation of accounting information can be applied to them.

In these circumstances multi-vector accounting becomes of great demand as an accounting technology based on such known and unquestionable accounting methods as accounts and a double entry, assessment and calculation methods, balance summary of accounting information. As a result, the emergence of a concept of multi-vector accounting may be discussed. It requires its justification, its essence should be revealed and the characteristics of the advantages of multi-vector accounting in conditions of unpredictable market relations are to be given. The theory of segmentation of accounting information initiated the process.

4.2. Global experience in multifunctional results of segment accounting, which marked the beginning of a multi-vector accounting technology

Due to the earlier adaptation of accounting techniques to the market environment international practice totally applies the principle of multi-vector accounting, which is ensured by the segmentation of accounting while forming accounting records. In 1997 IAS 14 "Segment reporting" [20] was introduced, the task of which was to adapt accounting information methods to certain segments: different types of products, goods, services, geographically differentiated sales of the company, to present profitability and business performance in different operational and territorial segments to users of financial reporting. It is the segmentation of business that has contributed to the emergence of segmentation in international accounting practices.

In international practice a segment starts to be positioned as a distinctive detachable business component that produces and sells a certain type of products or services, its risk-return profile is different from other business segments' risk-return profiles. However, already in 2006 The International Accounting Standards Board introduced

IFRS 8 "Operating Segments" [21], which replaced IAS 14 "Segment reporting" and expanded the scope of business segmentation in forming accounting records. However, the newly introduced standard did not change the range of companies that should provide segment information. Nevertheless, the standard put into accounting practice the category of an operating segment, represented as an organization component with the following specific features:

- (A) a segment is involved in both revenue-generating and costs-incurring activities, including revenues and expenses associated with transactions with other components of the same enterprise;
- (B) operating results of the segment are reviewed regularly by the enterprise manager responsible for operational decisions in order to decide on the resources to be allocated to the segment and evaluate the results of its activities;
- (C) the segment is accompanied by formation of discrete financial information in accounting [21].

Despite the segment's orientation toward the revenue component, an operating segment can carry out activities that temporarily do not generate revenue. A set of operations for acquisition and commissioning of non-current assets till the moment of revenue can be considered as an example. At the same time not every segment of business refers to the operating segment. So, a head office or a management company not focused functionally on earning income, but only on management functions (as a result of which income will be received), do not belong to operating segments.

It should be noted that in addition to the above mentioned other standards in the sphere of segment reporting formation are used in the world accounting practice, such as FAS-131 "Disclosures about Segments of an Enterprise and Related Information" (USA), SSAP-25 "Segmental Reporting" (UK). Standards similar to SSAP-25 exist in Canada, Israel, Italy and Singapore. In France, Germany, Belgium and the Netherlands segmentation reporting reflects only sector and geographical segments. Sales and profit of business segments are considered in financial statements of Korea. Such countries as India, Indonesia, Norway and Switzerland [19] do not use segment reporting at all.

These regulations structure the procedure for disclosing information in such financial statements as Profit and Loss Statement, Statement of Financial Performance in the context of business segments, it encourages developing of not only a business management strategy, but also an internal management tactics. In general the international standards shape the managerial approach to the formation of reporting on business segments, focused on corporate knowledge about the profitability and risks of certain business aspects. However, the international approach to the theory of segmentation is more focused on detailing the segments of business, rather than on expanding the methods of segment accounting within each segment, which helps to reflect the key indicators of the segment: revenues,

expenses, financial results accurately. In this regard, the multifunctionality of segment accounting can be expanded by multi-vector accounting. This category unites not only the set of techniques for indicating segments in the management system, but also the accounting methods for all accounting indicators within the segment. Management will benefit from applying methods of direct and indirect way of calculating the contribution of each segment to the overall performance indicators of the organization, which is important for making managerial decisions by the manager responsible for a particular business segment.

4.3. Evolution of Russian segment accounting to multi-vector accounting

Russian practice of multi-purpose accounting approach also has a long history of development. Even in the years of centralized economic management the operational production accounting was dispersed among costs centers, cost drivers in the form of commodity groups of products and even their technological components. The desire for discreteness in "planning and monitoring by segments of activity was laid back in the 1940s. And it was determined, first of all, by an increased influence of the control and regulating function on the management system by external environment of the organization. It is the dependence of a functioning enterprise on the external environment, or rather the desire to adapt to it, obliged enterprises to think about intra-organizational changes "[15].

Creating of internal links of the organization was considered in connection with external factors, which led to the detailed responsibility for the segments of domestic activities in management. Those responsible for managerial decisions could not disregard the external economic and technical potential in relation to the organization. In the late 50s it became one of the most important contributions of the system approach to management science. However, as interest in economic segments increased, in 1960s-1970s techniques for analyzing the performance of each segment separately became in demand. For each type of activity (industrial or agricultural production, transport services, maintenance, etc.), profit indicators were separately planned and monitored. Individual responsibility for analytical financial results for each segment was introduced. It was preceded by the fact that "at the beginning of 1970s some enterprises could serve a group of markets with different conditions and development prospects.

At the same time, several enterprises could operate in the same market and in the same field of demand. Extrapolation of previous activity results lost its actuality and reliability, made it impossible to evaluate all possible changes in the external environment in all their diversity. Therefore, there was a need to study the environment of the organization in terms of certain trends, dangers, opportunities that emerge from the state of this environment. So the strategic zone of management that is a separate segment of the environment, to which the firm has, or wants to receive, a way out, became a unit of such an analysis. The concept of situational approach as one of the main methods of management appeared "[15].

Starting from the beginning of restructuring economic relations the problem of segmentation has transformed into finding a compromise between the influence of external and internal factors on the economic segment, which led to the necessity to calculate the economic effect of each segment of activity on the basis of a comparison of revenues, expenditures and financial results. Not less demanded was the assessment of segment profitability regarding the individual responsibility of top managers. As a result of the evolution of the economic impact on the discreteness of accounting and analytical information in the management system, the external segment of managerial interest as a category of business has finally emerged: a type of activity, the region, the sales market, the consumer group.

At the same time, segments of internal management, such as structural subdivisions in the form of cost centers, responsibility centers in the form of business processes, as well as cost drivers in the form of separate commodity groups or even products, have become popular. In turn, the interest in a segment as a management category led to an interest in a segment as an accounting category. It was confirmed by scientific and practical studies of Russian researchers and practitioners in the field of segmentation [8, 11, 15, 19]. The most capacious content of the theory and practice of accounting segmentation in the management system is reflected in the book of the famous Russian scientist A.A. Sokolov "Accounting by segments of the activities of a commercial organization" [15].

In Russian practice of legislative accounting support the standard PBU 12/2000 "Information by Segments" is used, which discloses accounting practices in the context of mandatory segments required for the formation of financial statements. The accounting standard PBU 12/2000 "Information on Segments" in the system of standardized accounting is associated with the presentation of external reporting on various directions, types and markets of business activities in the context of certain segments by organizations. To a greater extent information on incomes and expenditures in the context of the approved segments, which is to be mentioned in accounting reports, is necessary when shaping and influencing opinion of owners and investors on the company's development strategy in future.

However, least of all, this standard reveals the managerial aspect of the activity when developing the tactics of internal management of the firm by top managers, which in many respects impoverishes the theory of segmentation in an applied aspect. The segment is not focused on obtaining knowledge about the effectiveness of a particular business process complying with production technology, about the contribution of each top manager to the company's aggregate result, and finally about the achieved performance of each internal unit. At the same time, a segment as an accounting category is to solve all possible accounting tasks since "from the point of view of managerial interest a segment of the organization's activity is perceived as an economic category of business, identified as a separate information resource in the information system of the enterprise " [18].

The accounting resource must have the entire set of accounting procedures: from methods for identifying the information segment in the management system to those for receiving both revenue and expenses and performance indicators of the segment. It should be noted that the latest techniques are relevant for management accounting, which has its own history of emergence and development. However, accounting segmentation is not regulated in the framework of management accounting, since it is considered within the framework of accounting, which reduces interest in management segments for the tactical business management purposes.

As a result, it can be argued that segment accounting and management accounting have their own independent accounting evolution history. Nevertheless, each of them has every reason to become a part of the theory of vector accounting, in which each accounting vector is characterized by its segment (s) in the accounting space, by techniques and methods of accounting information grouping, individual reporting formats, and ways to assess the performance of each segment.

Thus, in international and Russian modern management practice there are zones of interest in the results of accounting and management accounting by various users of accounting information. In this regard, it is appropriate to claim the emergence of multi-vector accounting, the theory of segmentation of activities being its basis.

4.4. The main components of the multi-vector accounting concept in modern management theory and practice

The ways to get profit in business are based on the use of various tools: improving the quality of products, expanding sales markets, optimizing costs, etc. However, all these techniques are focused on the principle of information, which enables to locate profit centers in order to move the maximum sales level to them. Against this background, the multi-vector principle of accounting and economic information is becoming popular, as it provides awareness of profits structure of the business. As it was stated above, in modern conditions the informational result of multi-vector accounting is designed to meet the interest of different groups of corporate reporting users.

At the same time, the interest of owners and investors should be really satisfied with the performance indicators of the accounting reporting, while the interest of corporate management should be also ensured by the confidence in the objectivity of the performance indicators implemented in the form of management accounting and management reporting. There is a need for such methods of corporate management, which "multiply" the same accounting information as many times as there are commercial interest zones. It is the "duplication" of the same accounting information for various purposes (or consumers) involving a variety of methods of centralization and decentralization of the accounting resource that is the essence of the multi-vector accounting concept. This method involves the use of information segments that reveal key indicators for areas of commercial interest, for example, distribution

of sales according to the type of activity, geographical area, source of financing, the distribution of costs by business processes and cost centers, etc. Its promise is to expand the management vectors, which should become objects of accounting and management accounting and information providers on their participation in the aggregate profits of the commercial organisation.

It is worth noting that the interest in multiple business results with the help of the accounting resource can be satisfied in two ways - extensive and intensive. The extensive way is based on increasing the number of various transcripts to accounting reports which formation methods are episodic and depend on subjective factors. The intensive way is based on the principle of systematic analytical information on various areas of interest of external and internal users. The use of accounts and a double entry allow synthetic information on the target indicators (incomes, expenditures, financial results, assets, liabilities, etc.) to "multiply" as many times as necessary for external and internal management.

It is the intensive way of information expansion that is the essence of multi-vector accounting in modern management. It aims at comparing the results of each vector accounting with the responsibility of a manager who is in charge for the indicators within the vector. To some extent, a vector and a segment are synonymous for accounting purposes. However, if in Russian and international practice the segment characterizes the information zone; the accounting vector in the context of information zones characterizes a set of methods for obtaining information in connection with the center of the responsibility for that information. The set of multi-vector accounting methods includes not only the typical methods of obtaining the accounting resource (accounts and double entry, assessment and calculation, reporting summaries), but also such methods as calculation of transfer incomes and transfer profits, methods of identification of responsibility centers and cost centers, methods of monitored indicators clustering, etc.

In this connection, it is possible to define characteristics of a multi-vector accounting as a set of typical and individual accounting methods in the context of different subjects of management, identifying the areas of financial responsibility and indicators within each zone, which will assess the contribution of each management subject to the company's performance indicators in terms of liability, the place of responsibility, the subject of liability. The purpose of this accounting is to choose a strategy for the development of a corporate business, assessing the impact of each top manager on changing the profitability of their own capital and the same managers' contribution to the total profit of the organization as a whole.

Of course, we can talk about the peculiar synonyms of multi-vector accounting, such as multifunctional or process-oriented accounting. However, such synonyms reflect the nature of the goals more in view of the types of activities, technologies, processes, which is more focused on the methods of assessing their value. Multivectoral accounting, integrates the entire set of methods and techniques

of its management, including the identification of responsibility for homogeneous groups of economic operations to justify incentives on a systematic basis. In this regard, besides its typical accounting functions multi-vector accounting is characterized with a motivational function. Figure 1 schematically shows the key functions of multi-vector accounting

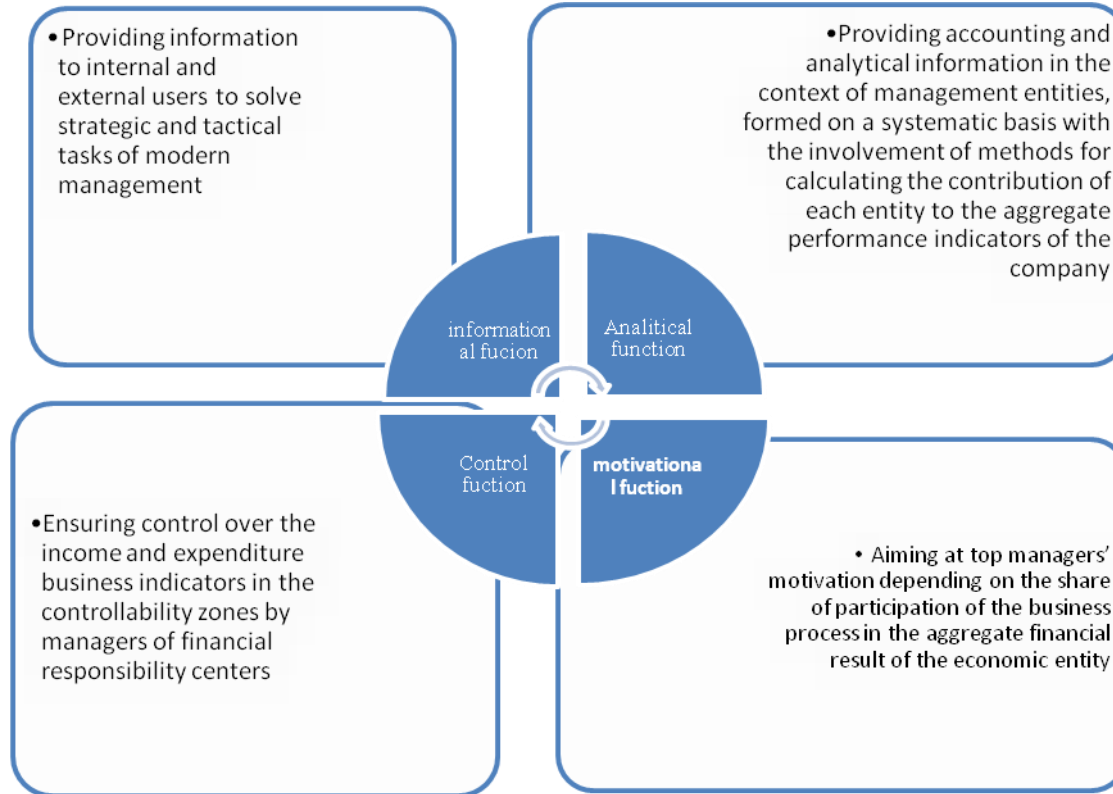


Figure 1. Functions of multi-vector accounting in modern management

All possible objects of accounting and management accounting, contributing to the provision of segmented accounting and management reporting are management subjects in the multi-vector accounting. The clustering of subjects, their characteristic features are revealed through the corporate accounting policy of the organization, which also reflects various techniques and ways of centralizing and decentralizing accounting information. Table 1 presents examples of possible management subjects, reasons for their allocation and consequences of accounting.

Table 1. Examples of management subjects of multi-vector accounting

№	The subject of management / examples	The purpose for allocating the subject	Consequences of accounting
Accounting (financial)			
1	Geographic segments (external market, internal market, subjects of the federation, etc.)	To assess and analyze the territorial distribution of income and profits and to shift the production to more profitable regions	To structure profits of the organization regarding geographical zones to estimate functional abilities of managers on internal and external sales
2	Operating segments (production, trade, transportation, insurance, etc.)	To structure the types of activity within the segments according to the profitability level	To estimate actual expenses regarding types of activity, to group them according to a level of profit and to generate a strategy of future sales
Accounting (management)			
3	Commodity groups (finished products, spare parts, tools, special equipment, etc.)	To structure commodity groups according to the profitability level	To estimate actual expenses in the context of commodity groups, to structure them according to profitability and to develop a sales strategy for the future
4	Cost accumulators (item unit of production)	To calculate the material and labor consumption of a commodity position	To confirm objectivity of pricing and return of a commodity position
5	Technological processes	To calculate the material, energy and labor consumption of technological processes	To confirm the objectivity of planning the material, labor, energy consumption and technological standardization according to processes
6	Centers of financial responsibility (business processes)	To confirm the functional ability of top managers to be responsible for the budget targets of their responsibility area	To assess the result of the management of top-managers according to the performance of their functional duties
7	Cost centers	To confirm the functional	To assess the result of

	(structural units)	ability of line managers to monitor the budget targets of the units	management of line managers according to the performance of their functional duties
9	Groups of buyers (state customers, commercial organizations)	To structure the groups of buyers according to the profitability level	To groups buyers according to profitability level and to develop the strategy of contracting department activity

Thus, being an approach of modern management the accounting vector is considered as an economic category of business, demanded within the information system of the organization to manage the key business indicators. Vector content consisting of specific methods based on accounting and management accounting techniques is going to turned information flow into the most demanded for management purposes of any commercial activity. It implies certain approaches to the selection of vectors as accounting objects, the features of the control of these objects, as well as the options for interrelations between them.

As a result, we can state the necessity to manage business activities on the basis of the results of vector accounting in the context of specific accounting areas that characterize business shares, uniting dependent and key indicators: revenues, expenses and financial results. External segments (types of activity, groups of buyers, etc.) and internal segments (cost drivers, cost centers, responsibility centers, etc.) act as the spheres of business distribution. Vector accounting is not only endowed with segments of information, but also with methods of selecting preferred accounting vectors, ways to obtain effective information for each vector in management accounting, including how to calculate the contribution of each vector to the company's aggregate figures. As a result, multi-vector accounting as a part of management technology can turn into an important management tool that facilitates the selection of the most profitable segments for the activities and more functional managers responsible for specific business processes. In addition, the need for external reporting to the founders and investors also makes a resource of multi-vector accounting required for strategic management decisions.

The approach to internal segmentation within the framework of multi-vector accounting from the point of view of organizing the control over the financial and economic activities of the entity is based on the principle that a successful marketing strategy requires three clear, separate, albeit related stages: management accounting, operational analysis, control tools. The segmentation strategy on this background assumes the choice of target segments as accounting vectors. An in-depth understanding of microeconomics (based on analysis) is transformed into strategic solutions that provide opportunities for more market-oriented and efficient management activities. The choice of business targets should emphasize all the distinctive advantages of the company and be accompanied with a quality

positioning in each of the accounting vectors. The analysis facilitates collecting the information for vector control. The process includes analysis of existing activities and their indicators, analysis of market trends, competition, brand positioning, the position of the company and the strengths of its portfolio of orders. Finally, the program for introducing a vector model for controlling economic indicators will enable the introduction of a segmentation strategy and highlight the most profitable segments of activity and top managers with the necessary potential.

5. Conclusion

Thus, the requirements of modern management have led to the need for discrete control and introduction of unique objects of not only external but also internal management control: external and internal segments that can constitute the essence of multi-vector accounting. Today it is indisputable to conduct segment accounting and reporting within the framework of a separate economic entity provided for in the relevant accounting standards and aimed, first of all, at ensuring the interests of external shareholders and investors.

However, the need for segmentation at the level of managerial accounting is not always unambiguous, when the areas of financial responsibility, cost centers, cost drivers, etc. act as internal accounting segments. The lack of a theory of managerial segmentation adapted to Russian practice weakens a theory of modern management. There is a need to develop a theory of multi-vector accounting, formed on the basis of primary accounting information, but implemented with the involvement of various methods of centralization and decentralization of accounting within the framework of accounting and management accounting in the context of various segments of information. On the one hand, multi-vector accounting should become a unified standard management tool in general, with unified requirements to its results of fiscal reporting, on the other hand, but it must remain a flexible management method within the company on the other hand. As a result, it can be argued that today management largely depends on multi-vector accounting applications that will expand the opportunities of modern business in a competitive environment. The multi-vector accounting function is already considered in scientific research as a form of business control that is to give an extensive list of tangible benefits:

- a new understanding of the role of business processes in the company's internal environment: updating tools for planning indicators of business processes or areas of financial responsibility; rational ways to assess the contribution of each business process to the total profit; new programs for motivating top-managers; strengthened program of the social component of business, etc.
- multi-vector accounting on a system basis will allow to identify the segments that are most involved in the formation of the company's profit;
- the most priority areas of activity can be brought to the forefront;
- there will be an opportunity to form an optimal structure of production and sales, as well as to model marketing programs, etc.

Thus, in management practice it is possible to standardize the key methods of accounting and management accounting in the context of different segments that are integrated into the theory of multi-vector accounting and which contribute to the formation of a business structure that is optimal for a given region and industry, with a specific top managers staff. The proposed multi-level management subjects, as a part of the multi-vector accounting system, are oriented towards the expansion of the accounting and management accounting system as the only provider of accounting and analytical information for strategic and tactical management purposes.

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