

Criteria for choosing the cost allocation base for industrial enterprises

Anatolii Kholkin^{1,*}

¹ Vyatka State University, 610000, Moskovskaya st., 36, Kirov, Russian Federation

Abstract. This article is devoted to solving the actual problem of forming a system of criteria for selecting an indirect costs allocation base. Therefore, the purpose of this article was to determine the criteria for selecting an indirect costs allocation base in industrial enterprises. To achieve this goal, the following methods were used: analysis, synthesis, generalization, thought experiment, tabular method, and graphical representation. In the result of using these methods, six criteria for selecting an allocation base were identified. For each of the criteria, a description and justification of its choice were given. Negative consequences were described in the form of cost distortions depending on the selected allocation base. The theoretical significance of this research is to develop cost allocation methods in terms of certainty of process of a choice of the allocation base. The practical significance of the article is the development of clear and unambiguous criteria, the use of which in the process of organizing cost accounting in terms of selecting the allocation base will increase the objectivity and provability of the result obtained. This article will be useful for researchers working in the field of developing the theoretical foundations of accounting and cost management, as well as practitioners in the field of management accounting, as well as managers at various levels.

1 Introduction

One of the most important problems that arise in the practice of accounting services of industrial enterprises is the problem of allocation of indirect cost. Since, if the process of allocating indirect costs is carried out incorrectly, the result may be distorted by the cost of a particular type of product. This can lead to incorrect and biased decisions of management entities.

One of the elements of the cost accounting organization process is the choice of the allocation base indirect costs, because there are alternatives of the indicators established as the basis of allocation of indirect costs. The choice of the allocation base is a professional judgment of the accountant. In addition, the correctness and objectivity of this judgment depends on the adequacy of the data obtained on the value of the cost of a particular type of product. This problem is particularly relevant for organizations with a wide range of products, which is typical for many industrial enterprises, especially in the field of mechanical engineering and Metalworking.

* Corresponding author: khav76@mail.ru

Solving this problem requires the correct definition and formulation of criteria for selecting the allocation base. However, in scientific articles and other sources of information, the selection criteria are not formulated with a sufficient degree of clarity, which makes it difficult both the selection process itself and the justification and confirmation of the decision made. In other words, the description of existing allocation bases, technique and methods of allocation in scientific publications is given, and the selection criteria are either not formulated, or not precisely formulated, which makes it difficult to implement the selection process in practice. This leads to the fact that each company makes an independent choice, acting on a whim, or making this choice intuitively.

The presence of this problem determined the relevance and practical significance of the study.

In this regard, the hypothesis of the study is that the choice of the indirect costs allocation base should be made based on certain, pre-established criteria, the application of which would make it possible to make a conclusion justified, objective, confirmed and evidential.

Based on the above problem and hypothesis, the purpose of the study is to determine the criteria for selecting an indirect costs allocation base of in industrial enterprises.

The study was carried out by consistently solving the following tasks that ensure the achievement of the goal:

- formulate criteria for selecting an indirect costs allocation base,
- provide a description of each criterion,
- justify the selected criteria.

The scientific novelty of the study consists in determining the criteria for selecting the allocation base, describing them and justifying them.

2 Literature review

This article is devoted to solving one of the problems that arise in the process of organizing both cost accounting and cost management in General. The reason for choosing this topic was the uncertainty and lack of clear and specific criteria, both in the literature and in scientific papers on cost accounting, cost calculation, management accounting and cost management. The rationale for the existence of this problem was the study of educational, scientific literature, scientific articles on the problems of cost accounting, management accounting and cost management.

The question of indirect costs allocation is a key question in the process of calculating the cost of production. Therefore, considerable attention is paid to this question in the educational literature.

In particular, William T. Baxter [1] included cost allocation issues in his textbook on accounting theory.

It should be noted that the question of indirect cost allocation and selection of the allocation base is ancient, so Michael Chatfield, Richard Vangermeersch [2] included these questions in their work on the history of accounting.

However, largely, the issue of indirect costs allocation and allocation bases is disclosed in books on cost accounting and management accounting.

In particular, this topic is covered in books: Michael Maher, Clyde P. Stickney, Roman L. Weil [3], John K. Harris, Charles T. Horngren [4], M.Y. Khan, P.K. Jain [5], Steven M. Bragg [6], Jawahar Lal [7], B. Banerjee [8], B.K. Mehta [9], Mohammed Hanif [10], E.J. VanDerbeck, M.R. Mitchel [11], Colin Drury [12], William Lanen [13], Madhav Rajan, Srikant M. Datar [14], Martin Mellman, Joseph Kerstein, Steven B. Lilien [15].

In all of the above books, only a description of the method of allocating expenses based on the selected base is made, which are accompanied by numerical examples. Numerical

examples provide for calculating the amounts of allocated expenses that are included in the cost of the cost accounting object. This is usually the end of it, since the authors of textbooks do not provide any comparison of the results obtained. The criteria for selecting an indirect costs allocation base are not defined or formulated in them.

In the book Cheryl S. McWatters, Jerold L. Zimmerman [16], it was established that the choice of the allocation base should be made dependent on the purpose of the organization's activities. At the same time, there is no indication of how this criterion should be applied in practice, as well as the rationale for its choice in the study book.

In addition, in the book of Andreas Taschner, Michel Sharifzadeh [17], it is written about the requirement to understand the need to select different cost allocation bases. This book does not provide an indication of the criteria for selecting the allocation base.

In the book Leslie G. Eldenburg, Albie Brooks, Judy Oliver, Gillian Vesty, Rodney Dormer, Vijaya Murthy, Nick Pawsey [18] it is proposed to select the allocation base depending on the cost classifications and their division into variables and fixed. The procedure for applying this selection criterion in the practice of the accounting service is not provided. Не указан порядок применения данного критерия и его четкое описание.

In the book James Jiambalvo [19], the following criteria for selecting a distribution base are given:

- Cause and effect, what does it mean that there is a causal relationship between costs and the distribution base;
- Relative benefits approach to allocation, that is, the profitability of the allocation approach
- Ability to bear costs, that is, it is acceptable to transfer costs.

However, in this book, the justification for the choice of bases is not fully given. In addition, these bases are used to allocate costs between departments, not products. There are also no criteria such as ease of accounting for base values, reducing the cost of accounting work. The criterion of connectivity (traceability) of the allocation base and output of a specific type of product is not defined. This means that using these criteria will not allow an adequate selection of the allocation base.

As well as the research topic is disclosed in the books on cost management.

In particular, the books of Don R. Hansen, Maryanne M. Women [20], Takashi Shimizu [21], discussed the issues of cost allocation. Selection criteria are also not defined.

In addition, in the book of Roman L. Wil, Michael W. Mayer [22], instead of considering the problems of selecting the distribution base, the criteria for selecting cost drivers are given in the conditions of applying the ABC method. Thus, there is a substitution of concepts.

The research topic is covered in the book of A. Ross, E. J. Pollock, S. J. Williams, and J. S. Todd [23]. Which provides selection criteria similar to those outlined in the book of James Jiambalvo [19], despite the fact that this book is devoted to management issues in the field of outpatient medicine.

However, all of the above works, unfortunately, do not fully disclose the issues of formation of criteria for selecting the distribution base, and, as a rule, the method of allocation of indirect costs based on the selected base is disclosed. These methods are usually illustrated with specific examples, based on which readers can only compare the base data from the positions of cost distortions due to the allocation of indirect costs. That is, the criteria for selecting the base are not clearly defined, which makes the selection process unproven.

A study of scientific articles on this issue has been conducted in recent years.

The study of scientific articles yielded the following results.

The article Yuhchang Hwang [24] offers its own original approach to the selection of the allocation base. The selection of the allocation base is carried out by searching for

alternative variants of the allocation base, and selecting the most appropriate management goals. Again, it is not specified which of the bases most corresponds to the management goals, that is, the system of selection criteria has not been developed.

In the article Katrin Toompuu, Tatjana Põlajeva [25], despite the fact that the title refers to the distribution of costs, the process of selecting cost drivers is disclosed, which is one of the elements of the ABC method. Thus, the topic of selecting an allocation base is not covered in this article.

Similarly, the article G. Cokins, S. Căpușneanu [26] provides criteria for selecting cost drivers used when applying the ABC method.

The studied articles, which are open to access, also revealed the substitution of concepts. The cost allocation base is replaced by the concept of “cost driver”, which is characteristic of the ABC method, rather than the traditional cost allocation method. The traditional cost method provides for a simplified cost allocation, in which all indirect costs previously recorded and collected by divisions (responsibility centers) are allocated among the calculation objects in proportion to the base. In contrast, the ABC method assumes preliminary accounting of costs not only by division, but also by function, with subsequent allocation of costs by function based on the value of the cost driver that falls on a specific object of calculation.

Thus, even in scientific articles, the criteria for selecting the allocation base are not clearly formulated, the use of which would make the selection process objective, justified and evidence-based. This also confirms the relevance and necessity of research, the results of which are presented in this article.

3 Materials and methods

As the basis or materials of the research, scientific works of various authors, local regulations (regulations) that determine the procedure for accounting costs and calculating the cost of industrial enterprises in the Kirov region were used.

The following research methods were used: analysis, synthesis, generalization, thought experiment, detail, tabular method, graphical representation.

Analysis is a method based on dividing a single object into separate parts and studying them in a variety of relationships and dependencies. The use of this method allowed us to study the process of selecting the allocation base and determine individual selection criteria.

Synthesis is the combination of individual parts or elements into a single whole, into a single system. The use of this method made it possible to link all the identified criteria together into a single system.

Generalization is the transition from the individual to the general. This made it possible to generalize the results obtained.

A thought experiment is an unreal (imaginary) experience with ideal objects, using which the foundations of a specific theoretical concept are identified and determined, or its limits are set. This method was used to identify, justify, and describe possible cost distortions when selecting certain bases, and to justify the need to use the identified and described selection criteria. Thus, the purpose of the experiment was to identify and describe the results of calculating the cost of certain types of products using different allocation bases in order to identify possible distortions in connection with different indicators that are the basis of the allocation. The experiment was conducted on each base, which allowed us to identify and describe possible distortions.

The table method is a method for summarizing and presenting data as tables. In this study, this method was used to generalize and present criteria and possible negative consequences.

A graphical representation is a method in which a process or result is represented as a graphical image – a drawing, diagram, or graph. In this study, this method was used to graphically display a system of criteria for selecting an allocation base.

4 Results

When solving the tasks, the author obtained the following results.

First, the criteria for selecting the base for the distribution of indirect costs are formulated and their classification is carried out. For ease of perception, the diagram shown in figure 1 illustrates the system of criteria.

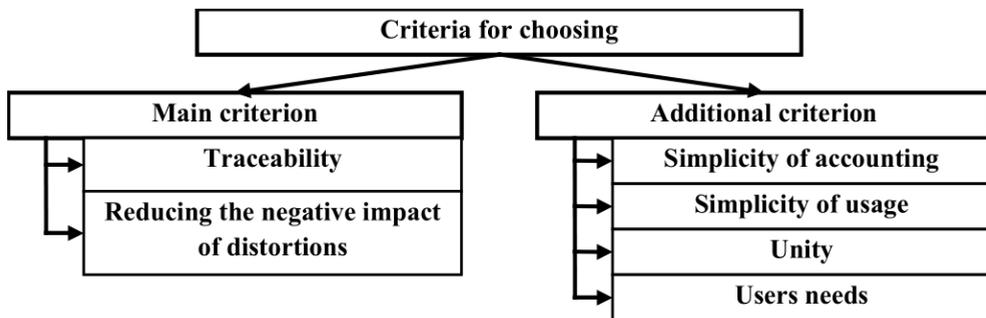


Fig. 1. Criteria for selecting an allocation base.

As shown in figure 1, all criteria are divided into two classes:

Class 1 are main criteria,

Class 2 are additional criteria.

This classification is developed based on the sign of mandatory use of the criterion when making a decision on the choice of the base. The main criteria should be used necessarily, and additional ones should be used as far as possible.

Table 1. Description of allocation base selection criteria.

Choice criterion	Description of the criterion
Traceability	The selected allocation base must be distributed between product types using the direct method and correlated with a specific product type. That is, as an allocation base, you need to choose an indicator that depends on the volume of output, both for a specific type of product, and the total volume of output as a whole
Reducing the negative impact of distortions	Consideration of possible negative consequences when choosing a distribution base in the form of cost distortions of specific types of products caused by <u>imperfection of the cost allocation methodology</u>
Simplicity of accounting	The cost of accounting work caused by the collection, grouping and generalization of information about the size of the allocation base as a whole, as well as its size, attributed to the production of a particular type of product, should be relatively low
Simplicity of usage	The amount of accounting labor costs incurred in connection with the implementation of cost allocation based on the size of the selected base should be small
Unity	The same allocation base should also be used when determining the planned and actual unit cost of a particular product type
Users' needs	The choice of the allocation base can be determined by the requirements of users of internal reporting, based on their needs for information necessary for management, as well as the experience and competencies of management personnel

The main criteria include the following:

1. Traceability.
2. Reducing the negative impact of distortions.

The additional criteria include the following:

1. Simplicity of accounting.
2. Simplicity of usage.
3. Unity.
4. Users' needs.

Second, each criterion for selecting the allocation base is described. Descriptions of each criterion are presented in table 1.

As can be seen from table one clear and unambiguously interpreted descriptions were given for all the formed criteria.

With regard to reducing the negative impact, their description was systematized through possible cost distortions. The description of distortions in the context of the selected allocation base is given in the table 2.

Table 2. Possible cost distortions for different allocation bases

Allocation base	A description of the potential distortion
Estimate allocation rates	A significant part of the costs will be allocated to the cost of products that require more time to use the equipment during manufacture
Direct labor costs	Most of the costs will fall on products with the highest labor costs, which in enterprises with a low level of mechanization will lead to a redistribution of costs in the cost of products with a high proportion of manual labor. At the same time, the cost of maintenance and operation will be included in the cost of more labor-intensive products in a larger amount than they are actually incurred in connection with the production of products. That is, in the cost of products that are more labor-intensive, but in the technological process which do not prevail or do not exist mechanized or automated operations. This disrupts the relationship between costs and the production of certain products, i.e. traceability
Costs by stage of the production process	The highest costs will be included in the cost of products made from expensive materials, or (and) more labor-intensive than other products
Processing costs (without material costs)	A significant part of the costs will be included in the cost of products that are more labor-intensive than other products
Number of hours worked by machines	Most of the costs will be included in the cost of products with a high proportion of mechanized and automated operations. It may be difficult to allocate costs for products that are made manually
Number of hours worked by workers	Most of the costs are allocated to the cost of more labor-intensive products, in the manufacture of which the share of manual labor costs is high
Mass or quantity of products	The largest part of the costs will be attributed to the most massive products, or to products whose output will be the largest, and not the most expensive from the point of view of equipment operation, that is, traceability is violated
Pre-set bids (ratios)	There may be distortions in the cost price, in the case of losses from defects, other losses, changes in production, product structure, composition and formulation, and other deviations in the production process
Cost or weight of materials	A high proportion of costs are included in the cost of material-intensive products, or products made from expensive materials, rather than those that require more equipment time and other costs to manufacture
Sales income	A large share of costs is allocated to the cost of products that have the largest share of total sales revenue, rather than products that incur the largest indirect costs during the manufacturing process
Reduced cost of production (without administrative and sales expenses)	Most of the costs are included in the cost of the product type the volume and production costs of which are the largest. It is possible that distortions made in the distribution of indirect costs that were previously included in the calculation of reduced cost may be affected
The cost of the finished product, determined based on the current (accounting) prices	A significant portion of the costs will be allocated to the cost of the product type whose output and pre-determined valuation (accounting price) are the highest

Table 2 shows allocation bases used in the practical activities of accounting services of industrial enterprises both in the Russian Federation and abroad as distribution bases.

Third, the justification of the selected criteria is given. Table 3 has been compiled to present the results of the justification

Table 3. Justification of selected criteria.

Choice criterion	Justification of the choice
Traceability	The choice of this criterion was justified by the need on the one hand, communication of indirect costs incurred with the production of a specific product, and on the other hand, achieving the ability to allocate indirect costs in the cost of a specific product
Reducing the negative impact of distortions	This criterion is selected because it is impossible to avoid distortions in the allocation of indirect costs. It is only possible to reduce distortions, or to ensure data comparability by applying the allocation base sequentially
Simplicity of accounting	The choice of this criterion is justified by the need to implement the requirement of rational accounting, the relation between the cost of accounting work and the result obtained
Simplicity of usage	The choice of this criterion is also justified by the implementation of the requirement of rational accounting
Unity	This criterion is due to the achievement of comparability of planned and reported indicators, which is due to the need for monitoring, control and cost analysis
Users' needs	This criterion is selected based on the purpose of the accounting system: maximum satisfaction of users' information needs

As indicated in table 3, a detailed justification for each criterion is given for its selection. In terms of criteria, the justification is given through the need to implement the basic principles of accounting, achieving the goal of the accounting system. For the main criteria, the justification is given based on the functional role of the criterion in the process of making professional judgment.

The author when solving the tasks using the above methods obtained all these results.

5 Discussion

When determining the criteria for selecting a base for allocating indirect costs, you must clearly understand the process of allocating indirect costs. This allows you to clearly answer the question: for what purposes and for what reasons it is necessary to select the distribution base. The answer to this question allows you to clearly describe the process of selecting an allocation base, as well as set criteria for selecting an allocation base.

Based on the study of the indirect cost allocation process and the selection of the allocation base, the following conditions (criteria) were identified that the selected allocation base must meet:

1. The allocation base should be related to the volume output of a particular product type and to the production process as a whole. Ideally the base should be determined and calculated for a specific type of product using the direct method. That is, traceability must be observed between the allocation base and the output of a particular product type. Therefore, this criterion can be abbreviated as «traceability».

2. Any allocation of costs associated with a kind of compromise between the need for determining the cost of a specific product and imperfection of the allocation base because the allocation base is not always closely associated with the production volume in whole

and production volume of specific products, in particular. Thus, any allocation leads to distortions in the cost of a particular type of product. Therefore, the choice of the base should be focused on reducing such distortions. To do this, possible distortions must be described separately for each of the allocation bases used. For simplicity, this criterion can be described as reducing the negative impact of distortions.

3. Implementation of any accounting procedure requires the cost of accounting labor. Collecting, grouping, and summarizing information about both the size of the allocation base and its size associated with the release of a particular product requires accounting labor. Therefore, the allocation base must be selected in such a way that the cost of accounting work that occurs in the process of determining the size of the base, were minimal or optimal, that is, correlated with the results obtained. This criterion can be described as simplicity of accounting.

4. When choosing an allocation base, you must also take into account that the distribution process itself, as an accounting procedure, is associated with the labor costs of employees of the accounting service. That is, the actual cost of implementing the allocation process depends on the selected base. Therefore, one of the conditions for choosing a base is the simplicity of calculating the amount of costs that are included in the cost of a particular type of product. This criterion can be called simplicity of usage.

5. Selecting an allocation base is one of the elements of the cost accounting organization process. However, since the cost accounting process is one of the elements, along with analysis, planning and control, of the cost management process, the comparability of both planned and actual costs must be ensured. This is achieved due to the unity of the allocation base both when determining the planned value of the cost price and its actual value. Therefore, the same allocation base must be used in planning and accounting. This criterion can be defined as the unity of allocation bases.

6. When choosing an allocation base, it is also necessary to assume that the purpose of the accounting system is to meet the needs of information users. The cost accounting system should be focused primarily on meeting the needs of internal users, the organization's management. That is, the internal reporting data, which discloses information about costs in the context of different groups, should be clear to the management of the organization. The understanding of reporting data is largely determined by the competencies and experience acquired by management. Therefore, it is necessary to investigate the user's competencies, which form their information needs. This means that the choice of the cost allocation base should also be determined by the information needs of users, because they are the subjects of decision-making and for the sake of meeting their interests, the entire accounting system should be built. This criterion can be defined as meeting the needs of users.

To apply the second criterion correctly, it is necessary to clearly describe the possible distortions in the formation of the cost price, depending on the selected allocation base. For these purposes, a table was previously compiled. It should be noted that the use of all allocation bases still leads to cost distortions, therefore, when applying this criterion, it is necessary to proceed from the «familiar evil» method, «when it is necessary to choose the familiar from two evils». That is, when choosing a base, you need to keep in mind that the correct and right picture of the allocation of costs will not work anyway.

Since there are more than one selection criteria, it is necessary to clearly define which criteria have priority use and which criteria can be ignored. To do this you need to classify the criteria based on their importance and priority of use when selecting a base.

All criteria are divided into two classes:

- Main criteria,
- Additional criteria.

The main criteria should include criteria that cannot be ignored in the selection of the allocation base. Therefore, it is necessary to include traceability criteria and negative impact reduction in this class. Because ignoring these criteria makes the selection process simply meaningless, devoid of any logic and objectivity.

Additional criteria include criteria that can be ignored if this is primarily appropriate for management needs. All other criteria are included in this class. The criteria for simplicity of accounting and simplicity of application can be ignored, since simplicity can lead to increased distortions and lower accuracy of cost allocation. The criterion of user needs can also be ignored because the user's competencies and experience tend to develop, expand, and improve.

The selected criteria require justification, which determines whether they can be verified and justified.

The choice as a traceability criterion is justified by providing a link between the indirect costs incurred and the production process of a particular type of product, which also determines the very possibility of allocating indirect cost.

Reducing the negative impact of distortions is chosen as a criterion because it is impossible to completely avoid distortions; it is only possible to reduce possible distortions, or to take into account the impact of distortions in the cost management process. However, it is necessary to reduce possible distortions.

Simplicity of accounting is chosen as a criterion due to the implementation of the principle of rational accounting. For the same reason, the choice of the criterion of simplicity of usage was made.

The choice as a criterion for the unity of allocation bases is justified by the need to achieve comparability of planned and reporting data, which is due to the unity of the cost management process itself.

User needs are selected as a criterion because the accounting system is built to meet the purpose of its existence, namely: maximum satisfaction of users' information needs.

The application of these criteria will allow not only to justify the choice of the allocation base based on the current scientific and methodological literature, but also to develop and use new, previously unknown to science and not used in practice, allocation bases that allow more accurately and objectively allocate indirect costs with optimal accounting labor costs. The development of new cost allocation bases is not the subject of this article, and may become the subject of future research.

6 Conclusion

This article provides a solution to possible problems associated with inadequate and unjustified choice of the indirect costs allocation base in the formation of the cost of certain types of products.

To solve this problem, a system of criteria for selecting a cost allocation base was developed. The criteria were identified based on a study of the process of allocating indirect costs, based on which the following criteria were identified:

1. Traceability
2. Reducing the negative impact of distortions
3. Simplicity of accounting
4. Simplicity of usage
5. Unity
6. Users' needs

For each criterion, clear descriptions were given that do not allow for ambivalent interpretation.

To apply the second criterion, possible cost distortions were identified and described when selecting a specific allocation base.

The most important for further research and application in practice is the use of formulated and justified criteria for the development and implementation of new indicators used as a base for the allocation of indirect costs.

Thus, the hypothesis formulated in the introduction is confirmed by certain, systematized and classified criteria, as well as by the formulation and justification of the proposed criteria.

At the same time, the author also confirmed that regardless of the selected cost distribution base, the cost of a particular product type would be distorted. This makes it necessary to develop new indicators that are used as a basis for the allocation of indirect costs, based on the criteria proposed in the article.

The results obtained can be used not only in the conditions of industrial enterprises, but also in the conditions of organizations of any form of ownership, place of business, industry affiliation. In General, using the results of the study will help to improve the efficiency of both the accounting system and the management of the organization as a whole.

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