

IMPROVEMENT OF THE CLASSIFICATION OF INNOVATION COSTS OF INDUSTRIAL ENTERPRISES

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Varchuk O. A. Improvement of the Classification of Innovation Costs of Industrial Enterprises

The article aims to study the classification of innovation costs of industrial enterprises based on different classification criteria and to improve it. The article proposes a theoretical study of the existing scientific works focusing on construction of a classification of innovation costs based on varying classification criteria. The conducted theoretical study allowed singling out three primary objectives of classification of innovation costs: determination of the cost of innovation; accounting, analysis, and control maintenance; managerial decision-making. The author studied the classification criteria and grouped them depending on the classification objective. The study describes an extended innovation costs classification based on the criterion of "the stage of the innovation process", which will allow estimating innovation costs at each stage of the innovation process, that is spending on fundamental and applied research, experimental design development, experimental work and technological operations (industrial production), commercialization of innovation, diffusion of innovation. Prospects for further research in this area consist in more detailed study and analysis of the composition and structure of innovation costs at each stage of the innovation process at the level of the region or an enterprise.

Key words: innovation costs, classification, classification criteria, objective, grouping, stages of the innovation process.

Fig.: 2. **Bibl.:** 8.

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Варчук О. А. Удосконалення класифікації інноваційних витрат підприємств промислового сектору

Метою статті є дослідження класифікації інноваційних витрат підприємств промислового сектору за різними класифікаційними ознаками та її удосконалення. У статті проведене теоретичне дослідження сучасних наукових джерел щодо побудови класифікації інноваційних витрат за різними класифікаційними ознаками. Проведене теоретичне дослідження дозволило виділити три основних мети здійснення класифікації інноваційних витрат: для визначення собівартості інновації; для здійснення обліку, аналізу та контролю; для прийняття управлінських рішень. Вивчені класифікаційні ознаки та проведене їх групування залежно від мети класифікації. Доповнена класифікація інноваційних витрат за ознакою «за стадіями інноваційного процесу», яка деталізує та дозволяє оцінити інноваційні витрати на кожній стадії інноваційного процесу, тобто витрати на: фундаментальні та прикладні дослідження, дослідно-конструкторські, експериментальні та технологічні роботи (промислове виробництво) роботи, комерціалізацію інновації, дифузії інновації. Перспективами подальших досліджень у цьому напрямку є детальне вивчення складу та структури інноваційних витрат на кожній стадії інноваційного процесу на рівні регіону або промислового підприємства та проведення їх аналізу.

Ключові слова: інноваційні витрати, класифікація, класифікаційні ознаки, мета, групування, стадії інноваційного процесу.

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Варчук О. А. Совершенствование классификации инновационных расходов предприятий промышленного сектора

Целью статьи является исследование классификации инновационных расходов предприятий промышленного сектора по различным классификационным признакам и ее усовершенствование. В статье проведено теоретическое исследование современных научных источников построения классификации инновационных затрат по различным классификационным признакам. Проведенное теоретическое исследование позволило выделить три основные цели осуществления классификации инновационных затрат: для определения себестоимости инновации; для осуществления учета, анализа и контроля; для принятия управленческих решений. Изучены классификационные признаки и проведена их группировка в зависимости от цели классификации. Дополнена классификация инновационных расходов по признаку «по стадиям инновационного процесса», которая позволит оценить инновационные расходы на каждой стадии инновационного процесса, то есть расходы на фундаментальные и прикладные исследования, опытно-конструкторские, экспериментальные и технологические работы (промышленное производство) работы, коммерциализацию инноваций, диффузию инновации. Перспективами дальнейших исследований в этом направлении является детальное изучение состава и структуры инновационных затрат на каждой стадии инновационного процесса на уровне региона или промышленного предприятия и проведения их анализа.

Ключевые слова: инновационные расходы, классификация, классификационные признаки, цель, группировка, стадии инновационного процесса.

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Innovation costs are one of the indicators used to determine how effectively industrial companies implement innovative activities. Innovation costs are the basis for pricing of a new product, so every company strives to forecast, plan and optimize them, which is impossible without a rational evidence-based classification and proper evaluation.

An evidence-based classification of innovation costs is the basis for their planning, accounting, analysis and control within the company, so the selected classification criteria must satisfy both scientific and practical interests.

The diversity of innovative costs, duration of innovation processes and the imperfection of the existing accounting system have caused emergence of a large number of classification criteria and suggest the relevance of the selected problem.

Questions associated with construction, extension and refinement of the classification of innovation costs are addressed by numerous domestic scientists: I. O. Blank, O. S. Borodkin, S. Yu. Hvozdiu, O. I. Hrytsai, Ya. D. Krupka, L. V. Napadovska, S. V. Syrtseva, L. I. Fedulova, O. M. Cheresniuk and others.

O. I. Hrytsai [3] believes that innovation costs may be classified not only by their usage area, into current and capital, transformational, organizational and transactional costs; they can also be classified into direct and indirect, controllable and non-controllable, and by the type of innovation.

S. Yu. Hvozdiu [8] proposed to extend the classification and subdivide the costs by the funding source, the life cycle stage, and the type of transaction.

S. V. Syrtseva [7] proposed to classify the innovation costs within stages of research and development using the principle of target orientation.

O. M. Chereszniuk [5] considers innovation costs as an element in formation of the cost of innovative products and suggests that they require a more detailed classification.

The *aim* of the article is to study the classification of innovation costs of the industrial enterprises based on different classification criteria and to improve it.

In order to achieve this aim, it is necessary to conduct a theoretical analysis of the current scientific literature and on its basis to form the author's own view on construction of a classification of the innovation costs; to determine the purpose of classification; to group classification criteria depending on the purpose of classification; to extend the existing classification of innovation costs based on the stages of the innovation process.

The study is carried out using the methods of analysis, comparison and generalization.

Problem statement. The existing classification of innovation costs of industrial companies is constantly updated and improved by scientists, resulting in numerous classification criteria, which allows grouping them depending on the purpose of classification.

Innovation costs are the costs that arise at all stages of the innovation process as the company pursues its innovative activities, that is the costs of fundamental research, applied research, experimental design development, experimental work, technological operations (industrial production), commercialization of innovations, and diffusion of innovation.

O. S. Borodkin [1] proposed to classify the innovation costs using the budgeted rates. This means, the first step is creation of the budget that lists all costs associated with implementation of innovation; while facing actual costs, it is possible to adjust the budget, which will allow receiving full, factual information about the innovation costs [1].

The State Statistics Committee of Ukraine provides the following classification of innovation costs:

- ✦ internal research and development activities (R&D);
- ✦ purchasing the R&D results;
- ✦ purchasing the machinery, equipment and software;
- ✦ purchasing other external knowledge;
- ✦ other expenses [2].

O. I. Hrytsai, S. M. Sychuk, O. M. Chereszniuk [3 – 5] propose the following classification criteria for innovative costs:

- ✦ by the manner of inclusion of innovation into the cost: direct, indirect;
- ✦ by the manner of economic exchange: transformational, transactional, organizational;

- ✦ by significance in terms of control: controllable (regulated), non-controllable;
- ✦ by the calculation period: current, capital;
- ✦ by the type of innovation: costs associated with R&D, related to the product, the process, marketing, or organizational management.

O. I. Hrytsai, O. M. Chereszniuk, N. V. Hryshko, Yu. A. Skubak [3, 5, 6] also consider that innovation costs should be grouped by the usage area: internal R&D activities, external R&D activities, purchasing machinery, equipment and software, purchasing other external knowledge, and other costs.

O. I. Hrytsai [3] extends the classification and proposes to single out innovation costs by the calculation period: current, capital.

N. V. Hryshko, Yu. A. Skubak [6] consider it impractical to classify innovation costs by the criterion of economic exchange and single out the following classification criteria: the calculation period, the manner of inclusion of innovation into the cost, significance in terms of control, the types and areas of innovation; they also illustrate the relationships connecting them.

S. M. Sychuk [4] believes that "the current classification of costs needs to be extended with grouping of the costs which take into account the innovation process" and provides the following classification criteria:

- ✦ by production life-cycle stages: pre-production, production, operation, utilization;
- ✦ by the nature of costs: current, capital;
- ✦ by frequency of occurrence: periodic, ongoing, one-time;
- ✦ by funding sources: own funds, credit funds;
- ✦ by the grouping principle: by economic elements, by pricing items;
- ✦ by the target orientation: the introduction of new equipment, technologies, creating new products.

O. M. Chereszniuk [5] also proposes to develop a more detailed classification of innovation costs by singling out the following classification criteria:

- ✦ by the cost driver: the innovative product costs, periodical costs;
- ✦ by the creation participants: costs of individual legal entities (purchasing); own costs;
- ✦ by the financing method: current, capital;
- ✦ by the economic elements: material costs, costs of human resources, contributions to social activities, depreciation, other expenses;
- ✦ by comparison with analogs: regulatory, additional.

S. Syrtseva [7] considers that the classification of innovation costs should be extended by adding more details and proposes to use the target orientation principle for classification of costs, namely "to single out the research stage and the development stage while forming intangible assets and results of research" and "to classify the costs by targets that a business entity can expect to achieve while implementing R&D within each stage":

- ✦ the research stage (pre-investment stage);
- ✦ forming the scientific and technological basis of the innovation project;

- ✦ choosing the alternative in implementation of the overall technology path;
- ✦ developing the technological solutions for creation of technologies;
- ✦ improving obsolete assets.

S. Yu. Hvozdiu [8] proposes to extend the existing classification of innovation costs with the following classification criteria:

- ✦ by the financing sources: the enterprise's own funds, budgetary and non-appropriated funds, funds of organizations in the business sector;
- ✦ by the life-cycle stages: market research costs, transformation of innovative ideas into finished products, production of innovative products, sales of innovative products, improving products, sale of intellectual property;
- ✦ by the transaction types: costs that arise when exchanging property rights, due to existence of communication barriers and psychological resistance to innovations;
- ✦ the costs of evaluating the individual contribution of the employee to innovation.

As we can see, there are many opinions regarding the construction of a classification of innovative costs, so we agree with O. M. Cheresniuk [5] who considers that "classifications cannot be the same for different purposes and must act according to the principle: different classifications for different purposes".

The author has developed her own model of the complete innovation process for industrial companies engaged in innovation activities. The model includes three main stages of the innovation process, which are further subdivided into several stages:

- ✦ the *scientific stage* (stages: fundamental research, applied research);
- ✦ the *practical stage* (stages: experimental design development, experimental work; technological operations (industrial production));
- ✦ the *commercial stage* (stages: commercialization of innovation; diffusion of innovation).

We consider it useful to extend the existing classification of innovation costs using the stages of the innovation process, which specifies and allows evaluating the innovation costs at each stage of the innovation process, namely the costs associated with: fundamental and applied research, experimental design development, experimental work and technological operations (industrial production), commercialization of innovation, diffusion of innovation (Fig. 1).

Each stage of the innovation process is accompanied by different costs that have their own specific characteristics and are determined by the innovation type.

The stages of "fundamental research" and "applied research" are characterized by costs associated with creation of innovation (these stages normally imply significant labor costs, social contributions, other costs (paying for communication services, business travels, rent, spending on purchasing scientific equipment and life cycle costs), whereas material costs are insignificant).

During the stages of "experimental design development", "experimental work", "technological operations (industrial production)", costs associated with production of innovation are formed (material costs increase (raw materials, supplies, fuel, energy), other costs can constitute a significant share, whereas labor costs and payroll fund charges decrease).

The final two stages, those of "commercialization of innovation" and "diffusion of innovation" are associated with implementation of innovation (implying growing marketing research, advertising, PR, legal service costs).

The innovation costs listed above include current costs (labor costs, social contributions, business travel costs, paying for communication services) and capital costs (associated with purchasing machinery, equipment, facilities, land parcels, objects of nature management, spending on purchasing the design rights and other intangible science and technology assets (patents, permits, licenses)). The proposed classification of innovation costs by the stages of the innovation process will allow studying them and drawing distinctions between them, evaluating the amounts of such costs.

Thus, the proposed classification will allow one to promptly receive the required information in order to plan, keep record of, analyze, and control innovation costs, which is in turn necessary for making reasonable managerial decisions on propriety of implementation of innovations.

The conducted theoretical study [3 – 8] allowed the author to establish that the classification of innovation costs must be built depending on the research area, on the tasks that need to be resolved, on the essence of the information that one needs to obtain, which is depending on the purpose and objective of classification.

Analysis of the views of researchers [3 – 8] on classification of innovation costs resulted in identification of three main objectives of the innovation costs classification: determination of the innovation cost; accounting, analysis and control maintenance; managerial decision-making (Fig. 2).

Thus, Figure 2 shows that:

- ✦ if the aim of classification is to determine the innovation cost, one requires a classification of innovation costs by the grouping method (by economic elements, by costing items), by the method of inclusion into the innovation cost (direct, indirect), by economic elements (material costs, human resource costs, deductions for social activities, depreciation, other expenses);
- ✦ if the aim of classification is accounting, analysis and control maintenance, then innovation costs should be categorized by the following criteria: economic elements, frequency of occurrence, calculation period, innovation areas, stages of the innovation process, the target orientation, the type of innovation, significance in terms of control, the manner of economic exchange, comparison with analogs;
- ✦ for managerial decision-making, innovation costs should be classified according to the areas of innovation, stages of the innovation process, the target orientation, the type of innovation, the manner of economic exchange, comparison with analogs.

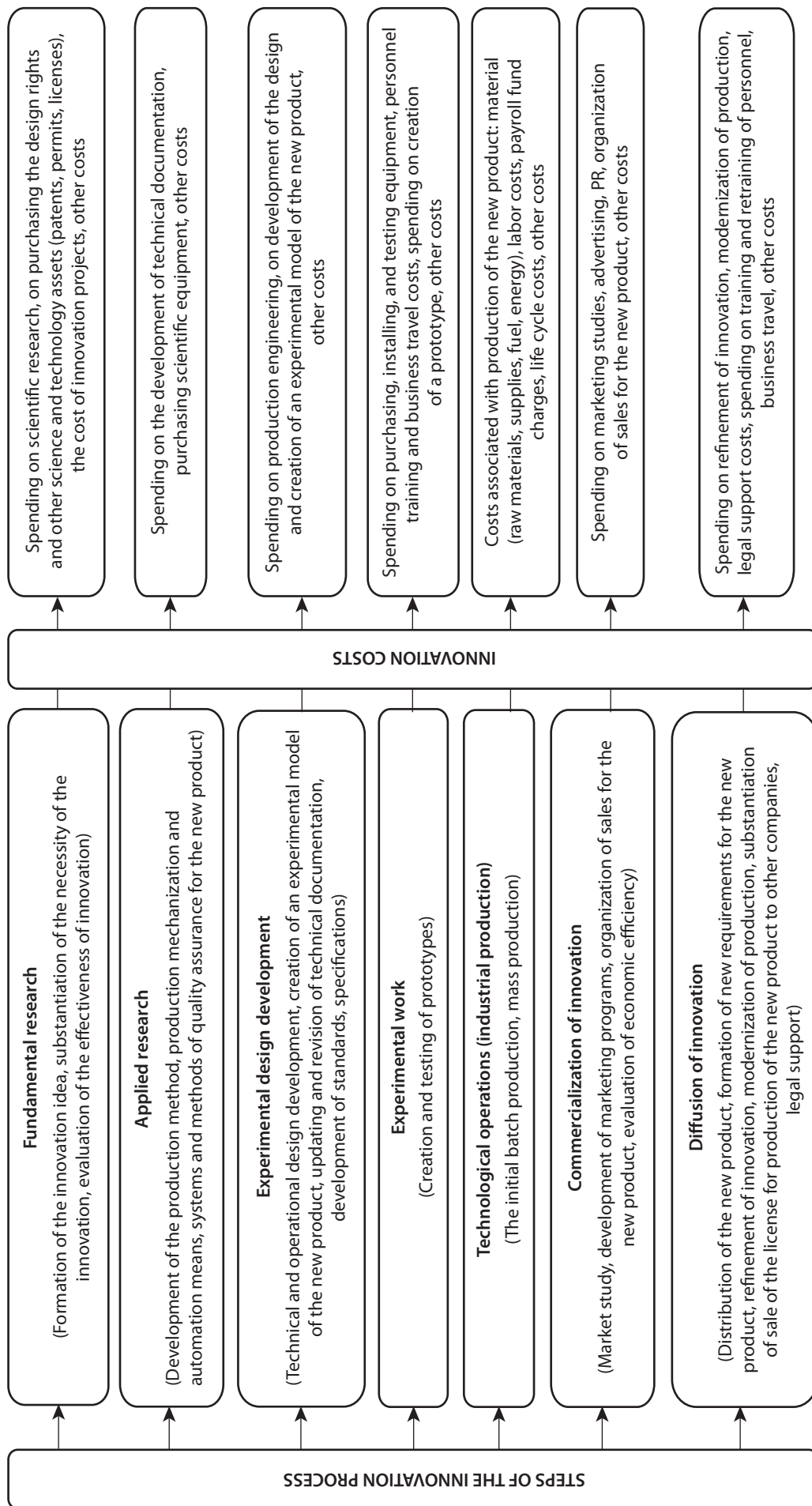


Fig. 1. Formation of innovation costs of industrial enterprises at various stages of the innovation process

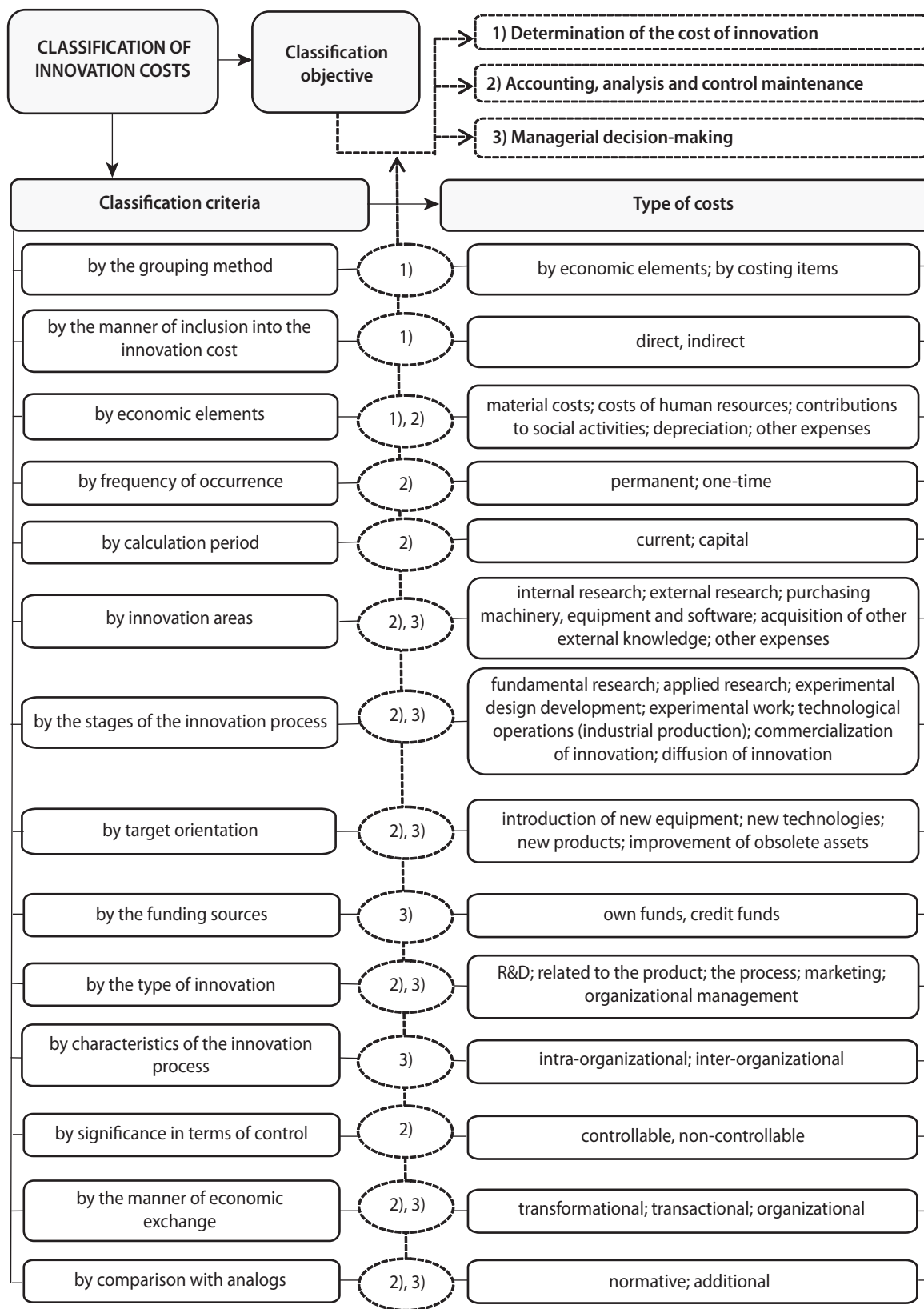


Fig. 2. Classification of innovation costs of industrial companies

Source: improved on the basis of [3 – 8].

Fig. 2 shows that some classification criteria can be used for different purposes, for example, the classification of innovation costs by economic elements is necessary for determination of the innovation cost and for their accounting, analysis and control maintenance; information on costs by areas and types of innovation, stages of the innovation process, the amount of expenses according to the manner of economic exchange and comparison with analogs may be required for accounting, analysis and control maintenance and managerial decision-making.

We believe that the proposed classification of innovation costs extends and refines the currently existing one and will allow obtaining comprehensive information on the amount of innovation costs, which can be used for different purposes.

CONCLUSIONS

The proposed classification of innovation costs will allow drawing a distinction between costs of regular activities and the innovation costs and will satisfy the needs of many users of this information.

The developed classification of innovation costs by the stages of the innovation process (fundamental research, applied research, experimental design development, experimental work, technological operations (industrial production), commercialization of innovation, diffusion of innovation) is reasonable because it forms an information basis required for planning, accounting, analysis, control, and making rational managerial decisions in terms of optimization of innovation costs.

Further research in this area will require more detailed study and analysis of the composition and structure of innovation costs at each stage of the innovation process at the level of the region or an enterprise. ■

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