MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY OF ECONOMICS

O. Iastremska
K. Iakovenko

CONTROLLING

Textbook

Kharkiv
S. Kuznets KhNUE
2016

UDC 055.935(075)
ВВС 65.290.-211.2я7
I-26

Рецензенти: завідувач кафедри економічної теорії Сумського державного університету, д-р екон. наук, професор *О. В. Прокопенко;* завідувач кафедри менеджменту організацій та ЗЕД Одеського національного економічного університету, д-р екон. наук, професор *І. О. Кузнецова*; канд. екон. наук, доцент кафедри менеджменту Національного технічного університету України "Київський політехнічний інститут" *О. М. Савицька.*

Рекомендовано до видання рішенням ученої ради Харківського національного економічного університету імені Семена Кузнеця.
Протокол № 10 від 27.05.2016 р.

Iastremska O.
I-26 Controlling : textbook / O. Iastremska, K. Iakovenko. – Kharkiv : S. Kuznets KhNUE, 2016. – 128 p. (English)
ISBN 978-966-676-661-1

The theoretical aspects of using controlling at an enterprise have been presented: its importance in enterprise management has been revealed; the objects of controlling (costs, responsibility centers), the aspects of management accounting as the basis for controlling, the features of budgeting, the issues of management decision making in controlling, the investment project controlling and organizational aspects of development of the controlling system at an enterprise have been described. Practical and situational tasks aiming to consolidate the theoretical knowledge are provided.

Recommended for students of higher economic educational institutions, in particular those who are taught in English, for listeners of training and advanced training centers and managers of enterprises.

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Introduction

Managers of each company in the course of their activities require high-quality, reliable, timely information about the financial, economic, production, competitor and other aspects on the basis of which it is possible to effectively plan the future development of the enterprise, to make effective decisions because the success of future development of the enterprise depends on the timeliness and accuracy of management decisions. Therefore, controlling serves an enterprise management system, which is based on the collection and processing, analysis and evaluation of information, providing its managers with recommendations for further decision-making aiming to improve the efficiency of the entire enterprise and realization of their goals.

Controlling transfers company management to a new level, integrating all functions of management to achieve the main objectives of an enterprise. Controlling is managing the future by building an effective management system in the present, providing successful functioning of the enterprise and all of its structural units, achieving goals and getting the desired financial results.

In this regard, there is especial necessity to study the academic discipline "Controlling" by students of economic higher educational institutions that will allow them to form the necessary competences for further use in the process of performing their professional duties.

The purpose of this textbook is the formation of systemic knowledge of the conceptual foundations of modern enterprise management based on the principles of controlling.

Mastering the methodical tenets of controlling makes it possible to complement the systemic knowledge of modern enterprise management in the market economy through the assimilation of the principles and methods of controlling, coordinating and directing the activities of various services and departments of the company to achieve operational and strategic goals.

The study of the discipline will provide for the formation of some competences, in particular the ability to use strategic and operative controlling; to initiate the creation of a controlling system at the enterprise; to justify, organize and implement controlling at the enterprise; to organize responsibility centers at the enterprise; to develop coordinated budgets for structural divisions of the enterprise; to provide analytical and information support of the decision-making process; to collect and process the initial information needed for decision-making

in controlling; to identify criteria for evaluating investment projects in controlling; to introduce modern accounting methods at the enterprise; to determine criteria for management decisions in controlling; to provide accounting and control for the effectiveness of the enterprise activity; to analyze breakeven in different periods; to implement measures securing long-term relationships with business partners; to monitor and use the latest advances in controlling.

The textbook covers the main theoretical aspects of controlling, which helps to get a comprehensive view of the systemic features of such this kind of activity at the enterprise, and provides practical and situational tasks aiming to help consolidate the acquired knowledge.

Part 1. The role of controlling in the enterprise management system

1. The essence of controlling, its importance in the enterprise management

1.1. The essence of controlling, its main purpose, functions

Controlling is a new line in theory and practice of modern management, which arose at the intersection of economic analysis, planning, management accounting and management.

Controlling makes a qualitatively new level of enterprise management, integrating, coordinating and directing the activities of the various services and divisions of the company to achieve operative and strategic objectives.

The word "controlling" originated from the English *to control* i. e. to monitor, manage. In the UK and the US the term "management accounting" or "managerial accounting" is more popular. The term "controlling" is used in Germany [17].

Controlling links together all management functions. It is a mechanism of management. For managers involved in controlling it is necessary to be broad-minded, be able to think analytically, have deep knowledge of economics, management and cybernetics. There are no ready-made solutions to the problems that arise at an enterprise. Managers usually have to combine different approaches to finding solutions under conditions of uncertainty and incomplete information.

The main purpose of controlling is to make effective organization and coordination of the system of enterprise management elements, provide orientation of the management process to achieve all the goals of the enterprise.

Controlling provides the following *functions:*

coordination of management activities to achieve the goals of the enterprise;

information and advisory support management decision-making;

establishment and ensuring the functioning of a common information system of enterprise management;

ensuring the rational management process.

The need for controlling at modern enterprises is caused by increasing instability in the external environment, which causes additional requirements to the management system of an enterprise, by displacement of attention

from the control of the past to the analysis of the future, by growing volumes of information and the importance of information support of operative and strategic decisions, by the need to provide a prompt operating system response to changes in the external environment and increase its flexibility, by creating reasonable action to ensure the survival of an enterprise and prevent crises situations, by complications of the enterprise management system, by increasing internationalization of the market relations and entrepreneurial activity, by the need to create additional practical basis to support basic management functions.

Controlling is a concept designed to eliminate bottlenecks and focus on the future in accordance with the goals and objectives of getting results [1]. It aims to ensure effective organization and coordination of elements of the enterprise management system. The main task of controlling is to provide long-term existence of companies, organizations and their structural units.

Controlling is the management function that performs the integration of other functions at an enterprise, focuses on the established goals of activity, helps to formalize interfunctional relationships in the management system, so as to help timely and fully achieve the established goals of the enterprise [16, p. 29].

Controlling is the system of planning, organization and control, oriented to goals, that provides integration, systemic organization and coordination of all phases of the management process, functional areas, organizational units and projects of an enterprise [8, p. 14].

In modern western theory, there are three main approaches to the definition of controlling [16, p. 25]:

the first definition identifies it with the notion of intraproductive (management) accounting (changing the direction of the accounting system from the past to the future, and, on the basis of accounting data, creating a system of support of management decisions);

the second approach regards controlling as a generalizing notion for many spheres (an integrated information system of an enterprise);

the third one provides management of management (coordination of activity of the whole enterprise management system). This approach facilitates the establishment of controlling as an independent economic trend.

In contrast to management, controlling is based on quantitative analysis and is more focused on cost parameters and planning and accounting calculations.

As soon as controlling is a special management function, it is closely linked with planning, accounting, analysis, control and regulation.

In *planning* controlling facilitates coordination of plans of units and development of a consolidated plan for an enterprise as a whole by providing information for the preparation of plans.

As for *accounting,* controlling provides accounting and control of costs and results of activity of units in various aspects.

With respect to *analysis,* controlling carries out the function of setting management tasks, collecting the most important data for decision making, consultations on choosing corrective measures and management decisions.

In terms of *control and regulation,* controlling compares the planned and actual data to measure and assess the degree of achievement of objectives, establishes the limits of permissible deviations, explains the causes of deviations and develops measures to eliminate the deviations.

There are three main functions of controlling:

planning of activity,

authorization of responsibility,

assessment of results.

The implementation of these functions assumes information technology, which combines the analysis of the past, the state of the current events and forecasts for the future.

1.2. The types of controlling

The basis of controlling is strategic planning, foresight of the real state of an enterprise (organization) in the market for the future, coordination of operative and strategic management. In general controlling is a system providing enterprise survival in two aspects: short-term – to optimize profit and long-term – to save and support harmonious relations and relationships with the environment. It is also considered as a set of methods for operative and strategic management which are combined at a qualitatively new stage of market relations. Controlling allows managers to carry out constant control of the achievement of both strategic and operative goals of the enterprise. Therefore the controlling system consists of strategic and operative controlling.

The goal of *strategic controlling* is to ensure the survival of the enterprise, constant control over the movement of the company to the target strategic goal, carry out an anticrisis policy. Strategic controlling helps to define the philosophy of the enterprise, its image and mission, to set concrete goals, define qualitative

indicators (return on investment, the available cash, sources of covering). It is responsible for the quality of development of strategic plans, helps determine to what extent the goals are justified and their achievement is possible.

The main tasks of strategic controlling are:

participation in determining the quantitative and qualitative goals of the enterprise;

development of alternative strategies, participation in the creation of strategic plans;

determining the "narrow spaces" (bottlenecks) and weaknesses of the enterprise;

establishment of basic parameters under control in accordance with the strategic goals;

comparing planned (standard) and actual indicators to identify the causes, culprits and consequences;

cost-effectiveness analysis, especially for innovation and investment.

Strategic controlling must help enterprises, organizations to efficiently use the existing advantages and create new potentials of successful activity in the future. Strategic controlling acts as a consultant for managers and owners in the development of strategy, setting goals and objectives.

Strategic controlling gives information for making decisions at the strategic level. It is mainly of a descriptive nature, because it mentions the strategic elements that the company has or aims to achieve. Strategic controlling refers to such questions as: "Are we on the right market, with the best products? Are we addressing the right target group? Do we manage to create a potential to make profit and get cash?" [40]

Operative controlling ensures compliance of the enterprise activity with common goals concerning the formulated strategy. Strategic planning and setting the main goals require checking the achievement of the goals taking into account the realities of the enterprise functioning at the operative level.

The goal of *operative controlling* is to create a management system of achievement of current goals and make timely decisions on optimizing the ratio "cost-profit". It provides support of operative management decisions for organization of rhythmic work and prevents from crisis situations in the enterprise activity.

Operative controlling is focused on the economic efficiency and profitability of the enterprise and its liquidity.

The main tasks of operative controlling are:

management of planning and budgeting;

determination of "narrow spaces" (bottlenecks) and weaknesses for current management;

determining the basic parameters under control in accordance with the current goals;

comparing the planned and actual indicators to identify causes, culprits and consequences;

analysis of the impact of deviations on the implementation of current plans;

motivating managers to make effective decision.

In contrast to strategic controlling, operative controlling aims to achieve short-term goals. The basic parameters under control in operative controlling are: profitability; productivity; the degree of liquidity.

The basic tools of strategic and operative controlling are presented in Table 1.1.

Table 1.1

The tools of strategic and operative controlling

Strategic controlling	Operative controlling
1	2
Strategic planning. Portfolio analysis. SWOT-analysis. Benchmarking. Balanced Scorecard (BSC). GAP-analysis, scenario analysis, potential analysis. Competition analysis. Product life cycle analysis and product-market growth matrix. Risk matrix. Market attractiveness and competitive strengths analysis	Operative planning. Budgeting. ABC-analysis. Comparison of the current and planned indicators. Break-even analysis. XYZ analysis. Value analysis. Costing methods

The distinguishing features of strategic and operative controlling are presented in Table 1.2 [12, p. 15].

Table 1.2

The comparative characteristic of strategic and operative controlling

Features	Strategic controlling	Operative controlling
Orientation	Enterprise potential	Concrete result
Management level	Top management	All levels of management
Objects of planning and control	Not identical	Coincide
Evaluation	Risks, strengths and weaknesses	Revenues, expenses, production volume
The range of goals	Ensuring the long-term existence of the organization, enterprise	Economic efficiency, profitability, productivity, liquidity

So, the main difference between the strategic and operative controlling is the fact that the first one is focused on future trends, and the second one is aimed at the present, that is the difference between the strategic and operative controlling is the difference between the goals and means of achieving them.

Operative controlling provides regular monitoring and informing managers of an enterprise about the appearance of unacceptable deviations from the planned economic level of production. Based on the data of operative controlling, measures for urgent elimination of these deviations are developed which gives the opportunity to adjust the course of the enterprise development. It is recommended that the systems of strategic and operative controlling be created in a single professional center for approval of the basic goals and necessary preconditions for their implementation.

1.3. The structure and content characteristics of the controlling elements

Structurally, the following elements can be identified in the controlling system [17, p. 16 – 21]:

setting goals;

planning;

management (managerial) accounting;

information flows system;

monitoring;

control;

analysis of plans, results and variances;

developing recommendations for management decision making.

Setting goals includes determination of quantitative and qualitative objectives, selection of criteria for the assessment of the degree of achievement of the set goals.

Planning converts the goals of the enterprise into forecasts and plans. Strategic controlling requires, prior to making a plan, to analyze the strengths and weaknesses of the company, opportunities and threats. On the basis of the analysis of the company, the strategy is developed, and then plans are made. The plan makes it possible to estimate the real achievement of the goals, what helps and what hinders to achieve them.

Controlling participates in the development of planning methods, coordinates the activities of various divisions and services of the enterprise in the planning process, as well as assesses the plans, determining how they comply with the objectives of the enterprise, how they stimulate to action, how realistic their implementation is.

Management accounting is a reflection of the whole financial and economic activity of the enterprise in carrying out the plans. As an element of the controlling system, it is fundamentally different from financial accounting.

Management accounting is focused on information needs of managers of the enterprise and units, on the support of management decision making, while financial accounting is oriented to external users.

The information flow system provides information support for management decisions.

Controlling is a provider of information which is necessary for functioning of the enterprise management system. The information the controlling system provides must meet the following requirements: the relevance (essentiality, significance), reliability, completeness, usefulness, timeliness, regularity. Any information must comply with these requirements, however, the significance of the different requirements is different. For financial accounting it is reliability. For management accounting it is relevance.

For management decision making only data directly related to the decision is considered relevant. These are conditions under which a decision is made, the target criteria, a set of possible alternatives, consequences of the adoption of each of the alternatives.

Possessing the information the manager can carry out monitoring of all the financial and economic activity.

Monitoring is tracking the proceeding processes at an enterprise in real time. It also includes preparation of operative reports for short periods of time and comparison of target results with actually achieved results. Based on this comparison, conclusions are drawn about the strengths and weaknesses of the enterprise, about the dynamics of their changes, as well as favorable and unfavorable trends in the external environment. Changes in the external and internal environment of an enterprise entail the revision of the target parameters, namely checking whether the goals are optimal under the new conditions, whether the enterprise will be able to achieve its goals because of the changes that have occurred. Based on the change of the target parameters and prediction of changes of strengths and weaknesses of the enterprise, the plan is corrected and measures for its implementation are developed.

Control is generally engaged in fixing the already accomplished facts and events. In controlling it is aimed at the future.

In controlling control realizes the following functions:

1) preliminary control which includes:

control of goals (the correctness of goal setting, correctness of construction of the enterprise hierarchy of goals, whether the goals do not contradict each other, how adequately the quantitative criteria reflect the qualitative goals of the enterprise);

control of forecasts to determine whether they are realistic, substantiated and whether they help the enterprise to solve set tasks;

control of the gap between the target and predicted values;

control of limitations – determining which of the external and internal conditions hinder the enterprise from achieving its goals;

control of plans – determining how optimal the plans are and whether they do not contradict each other;

budgetary control – control of costs of the enterprise divisions through the development of budgets;

2) current control which involves control and monitoring of the external and internal environment of the enterprise for the purpose of early detection of problems;

3) final control that is control of the fulfillment of plans (calculation of deviations of the actual values from the planned ones, analysis of the causes of deviations).

Thus, in controlling control is focused on the present and the future rather than on the past.

As a result of the control, *analysis* is carried out. Analysis of the past evaluates whether the enterprise has achieved the goals, what prevented from doing this, what the strengths and weaknesses of the enterprise are.

Analysis of the present helps to determine in what direction the enterprise is developing.

Analysis of the future evaluates whether the enterprise will be able to achieve the goals, what risks it will face, what its opportunities are.

Recommendations for management decision making are generated according to the results of the analysis. Controlling helps determine which alternative actions the enterprise can take, makes it possible to evaluate them in terms of achieving the goals by the enterprise as a whole and by its divisions.

Some authors distinguish such four elements in the controlling system as: philosophy (the goals and principles of the system), tools, organization and the process of controlling [8, p. 14].

Thus, due to its integration, controlling provides a holistic view on the activities of the company in the past, present and future, an integrated approach to identifying and solving problems in the company.

Questions for self-study

1. The structure of the controlling system, characteristics of its elements.
2. The history of controlling.
3. Interrelation of controlling and management functions.

Questions for self-assessment

1. What is the essence of controlling as a new economic trend of a company?
2. What is the role of controlling in the enterprise management system?
3. What types of controlling are there?
4. What are the goal and main tasks of strategic controlling?
5. What is the essence and objectives of the operative controlling?
6. What are the differences between strategic and operative controlling?
7. What are the instruments of strategic and operative controlling?
8. What are the elements of the system of controlling?

2. The objects of controlling and their classification

2.1. Costs as the object of controlling

Since the most important task of controlling is profit management, so the costs, their types, the places of their origin, the principles of cost management are in the major focus of its interest. Heads of different services and departments are responsible for the amount of costs at the enterprise. Therefore, the main objects of controlling are costs and responsibility centers.

The achievement of the optimal level of costs is an important condition for a successful activity of an enterprise, resulting in the increased competitiveness of products and services, of the enterprise itself. The costs of the enterprise are not the same by nature and they have different characteristics by which they can be attributed to some economically homogeneous groups. For cost management they should be classified in different aspects. Knowing the difference between various characteristics is needed for planning, accounting and analysis of costs. When a manager makes a decision he/she must be clearly aware of all its consequences, know which costs and revenues it will cause.

The classification of costs is based on the principle "different costs for different purposes".

There are three lines of classification of costs in the controlling system (Fig. 2.1) [12, p. 18]:

costing, determination of price and determination of financial results;

management decision making;

control and regulation.

Let's consider the types of costs in each of the lines [42].

The first line considers those costs that provide a rationale behind the costing of a product, determination of the price and the correct determination of the financial results of the company.

Manufacturing costs and *nonmanufacturing costs*. This classification is usually used by manufacturing enterprises.

Manufacturing costs include: 1) direct materials; 2) direct labor; 3) manufacturing overheads. Materials that become an integral part of the finished product and that can be easily traced to it are called direct materials. For example wood is a direct material for the manufacturers of furniture. The labor cost that can be physically and conveniently traced to a unit of a finished product is called direct labor cost or "touch" labor cost. An example of direct labor cost includes labor cost of machine operators at a manufacturing

enterprise. Manufacturing costs other than direct materials and direct labor are categorized as manufacturing overhead cost (also known as factory overhead costs). It usually includes indirect materials, indirect labor, salary of the supervisor, lighting, factory heating etc.

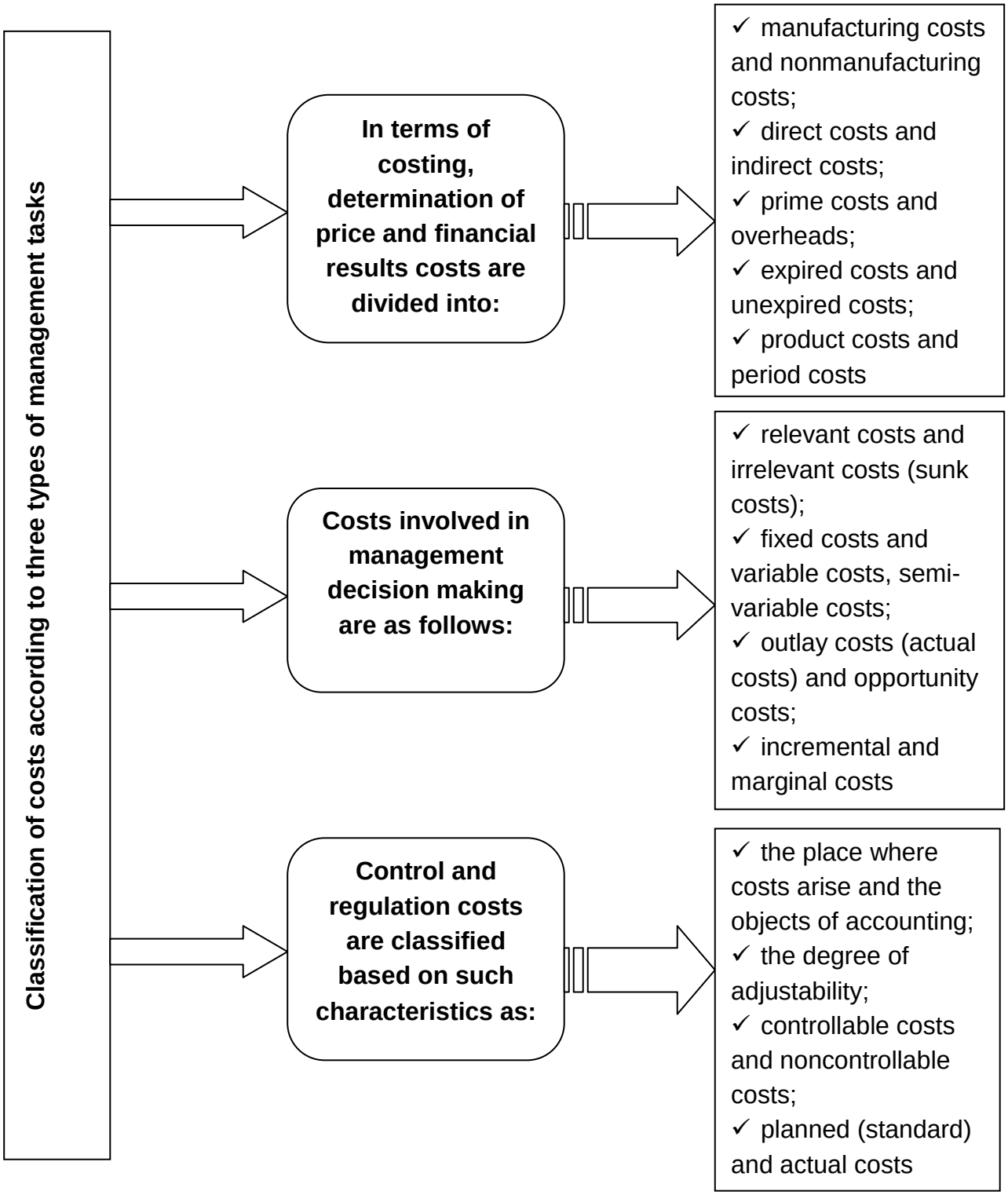

Fig. 2.1. **Classification of costs in accordance with three types of management tasks**

Nonmanufacturing costs include: 1) marketing and selling costs (advertising costs, order taking costs and salaries of sales persons etc.); 2) administrative costs (salaries of executives, accounting costs, and general administration costs etc.).

Manufacturing costs are included in production (operating) costs; non-manufacturing costs are taken into account in the calculation of financial results.

Direct costs and *indirect costs*. The purpose of this classification is to assign costs to cost objects (a cost object means any thing about which cost information is collected. Some examples of cost objects are products, departments, customers, a plant, a territory, a product line and research and development activities of the business etc.).

A cost that is easily traceable to a particular cost object is known as direct cost. The use of the term "direct cost" is not limited to direct materials and direct labor. Every cost that can be easily and conveniently traced to a particular product, customer, branch, plant or any other cost object is a direct cost.

An indirect cost is a cost that is not easily traceable to a particular cost object. For example, a clothing factory produces different varieties of cloths. The salary of the manager would be an indirect cost because it is caused by all the varieties and is not easily traceable to a particular variety. When we say direct or indirect cost, we mean that it is direct or indirect with respect to a particular cost object. A cost may be direct for one cost object but indirect for another one.

Prime costs and *overheads*. Prime costs are expenditures that directly relate to the production of finished goods. In other words, these expenses are directly incurred in creating finished goods. Prime costs consist of direct materials and direct labor.

Overheads are costs required for running business, but which cannot be directly attributed to any specific business activity, product, or service. Examples of overheads are accounting and legal expenses, administrative salaries, depreciation, insurance, rent, utilities.

The sum of direct labor costs and manufacturing overhead costs is known as *conversion costs*.

Expired and *unexpired costs*. Unexpired costs (assets) are those which are applicable to the production of future revenues. Examples of such unexpired costs are inventories, prepaid expenses, investments, and deferred charges.

Expired costs are those which are not applicable to the production of future revenues, and for that reason are treated as deductions from current revenues or are charged against retained earnings. Examples of such expired costs are costs of products or other assets sold or disposed of, and current expenses.

Product costs and *period costs*. This classification is usually used for financial accounting purposes.

Product costs (inventoriable costs) are those costs that are incurred in acquiring or manufacturing a product. For a manufacturing enterprise, these costs usually consist of direct materials, direct labor, and manufacturing overheads. Product costs are initially treated as inventory and do not appear on the income statement until the product for which they are incurred is sold. When the product is sold, these costs are transferred to the cost of goods sold account.

Period costs are those costs that are not included in product costs. Usually, these costs are not part of the manufacturing process and are therefore treated as expenses for the period in which they arise. Period costs are not attached to products and the company does not need to wait for the sale of products to recognize them as expenses. According to the generally accepted accounting principles (GAAP), all marketing, selling and administration costs are treated as period costs. Examples of these costs are office rent, interest, depreciation of the office building, sales commission and advertising expenses etc.

The second line of classification provides grouping of costs to make effective management decisions.

When making management decisions, first of all, relevant and irrelevant costs must be distinguished.

Relevant and irrelevant costs [52].

In any managerial decision involving two or more alternatives, the prime focus of analysis is to find out which alternative is more profitable. The profitability of alternatives is determined by considering the revenues generated by and costs incurred under each alternative. Some costs may stay the same regardless of which alternative is chosen while some costs may vary between the alternatives. The classification between relevant and irrelevant costs is useful in such situations. Examples of situations in which the relevant and irrelevant classification is useful include decisions regarding: shutting down a division of a business; accepting a special order at a lower price; making a product in-house or purchasing it from outside; selling a semi-finished product or processing it further, etc.

Relevant costs are costs that are affected by a managerial decision in a particular business situation. In other words these are the costs which shall be incurred in one managerial alternative and avoided in another. As the name suggests they are "relevant" for managerial analysis and should be considered in all calculations made for the purpose.

Irrelevant costs are costs that are not affected by the ultimate decision. In other words, these are the costs which shall be incurred in the all managerial

alternatives being considered. Since they are the same in all alternatives, they become irrelevant and need not be considered in calculations made for managerial analysis.

*T*he difference between the costs of two alternative decisions is called *differential costs*.

The costs that have already been incurred and cannot be changed by any decision are known as *sunk costs.* For example, a company purchased a machine several years ago. Due to change in fashion in several years, the products produced by the machine cannot be sold to customers. Therefore the machine is now useless or obsolete. The price originally paid to purchase the machine cannot be recovered by any action and is therefore a sunk cost. These costs should not be taken into account while making any decision because no action can reverse them.

Opportunity and outlay (actual) costs. Outlay costs (also called "actual costs") are defined as the costs or expenditures which an enterprise incurs when producing or acquiring a good or service. These costs are recorded in the books of accounts of a business unit (for example, the cost of raw materials, wage bills etc.).

Opportunity cost is concerned with the cost of forgone opportunities/alternatives. In other words, it is the return from the second best use of the firm's resources which the firm forgoes in order to avail of the return from the best use of the resources. It can also be described as comparison between the policy that was chosen and the policy that was rejected. The concept of opportunity cost focuses on the net revenue that could be generated in the next best use of a scare input. Opportunity cost is also called an "alternative cost". An example of opportunity cost: if a company owns a land, there is no cost of using the land (i.e., the rent) in the company's account; but the company has an opportunity cost of using the land, which is equal to the rent forgone by not letting the land out on rent.

Incremental costs and marginal costs. Marginal cost is the cost of producing an additional unit of output. Incremental cost is defined as the change in cost resulting from a change in business activities. In other words, incremental cost is the total additional cost related to the marginal quantity of the output. This classification is important for planning the operation activity.

Variable, fixed and mixed (semi-variable) costs. As the level of business activities changes, some costs change while others do not. The response of a cost to a change in business activity is known as cost behavior. Managers should be able to predict the behavior of a particular cost in response to

a change in particular business activity. For this purpose, costs are classified as variable, fixed and mixed costs.

Variable costs are costs that change, in total amount, with the change in the level of activity (for example, direct materials cost). Variable costs vary in a linear fashion with the production level. However, when stated on a per unit basis, variable costs remain constant across all production levels within the *relevant range* (the relevant range is the range of activity (e.g., production or sales) over which cost behavior stays valid). The relationship between the variable costs and the output volume is presented in Fig. 2.2 and 2.3.

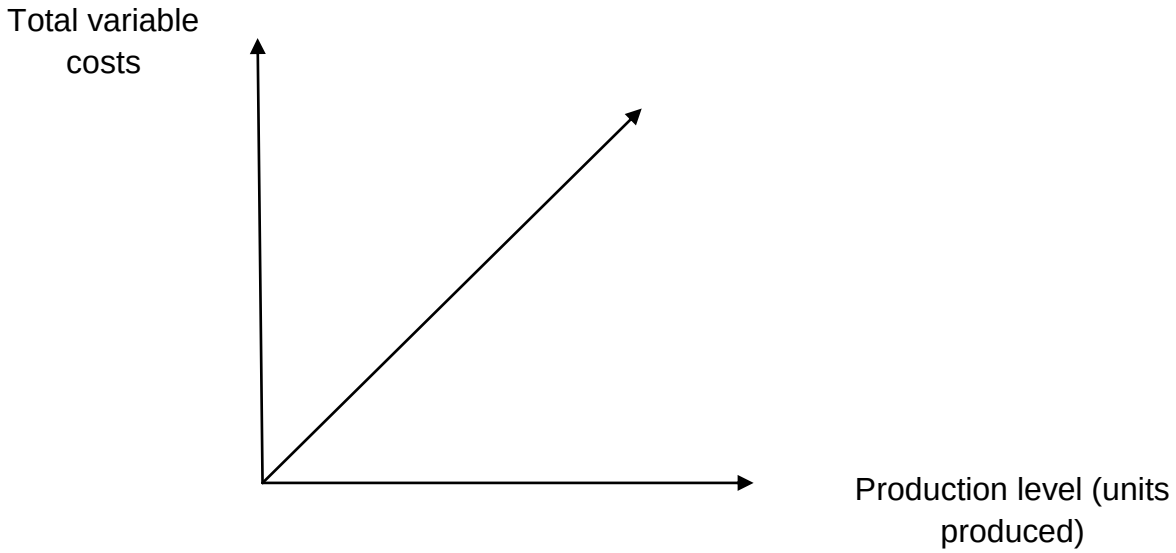

Fig. 2.2. **The behavior of total variable costs**

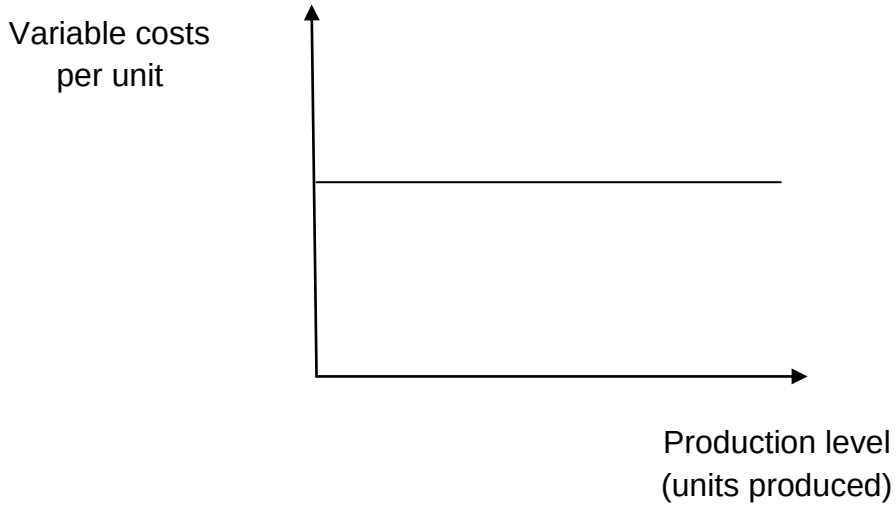

Fig. 2.3. **The behavior of variable costs per unit**

Fixed costs are costs that do not change, in total, with the change in activity (for example, rent). Total fixed cost does not change with the change in activity but per unit fixed cost changes with the rise and fall in the level of activity. There is an inverse relationship between the per unit fixed cost and activity. If production increases, per unit fixed cost decreases and if production decreases, per unit fixed cost increases. Fixed cost per unit decreases as production increases, because the same fixed costs are spread over more units. Average fixed cost decreases as the production increases. It is an interesting property of fixed cost.

The behavior of fixed costs is presented in Fig. 2.4 and 2.5.

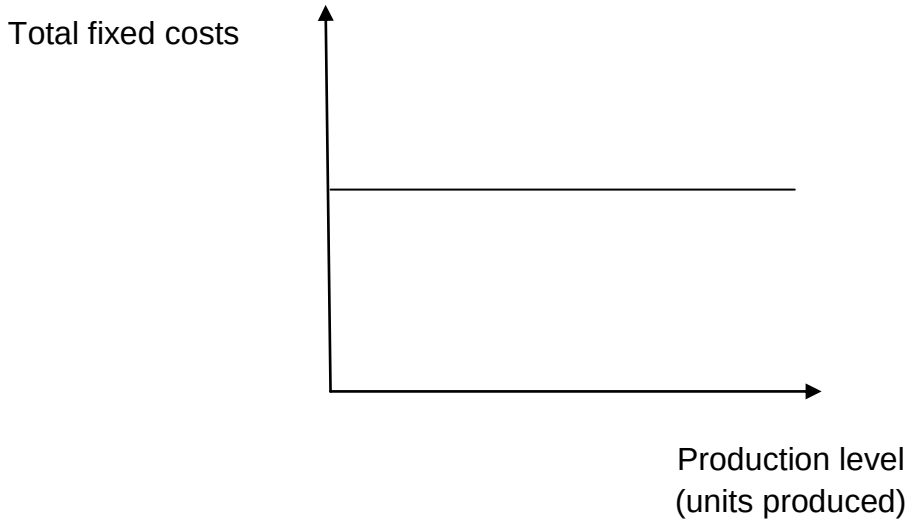

Fig. 2.4. **The behavior of total fixed costs**

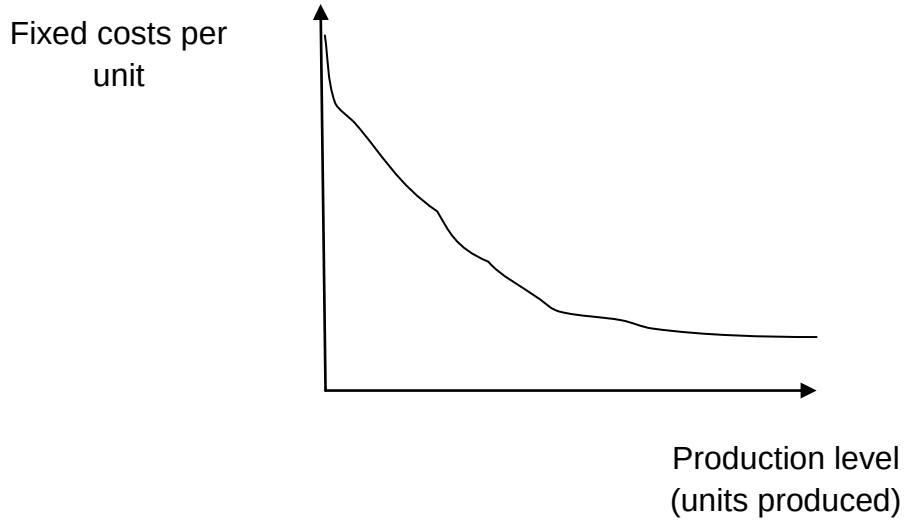

Fig. 2.5. **The behavior of fixed costs per unit**

Total fixed costs remain the same within the relevant range. In other words, fixed total costs remain constant only for a short period when production capacity does not change during a long time. In the long-term period fixed costs change in a stepwise manner (Fig. 2.6).

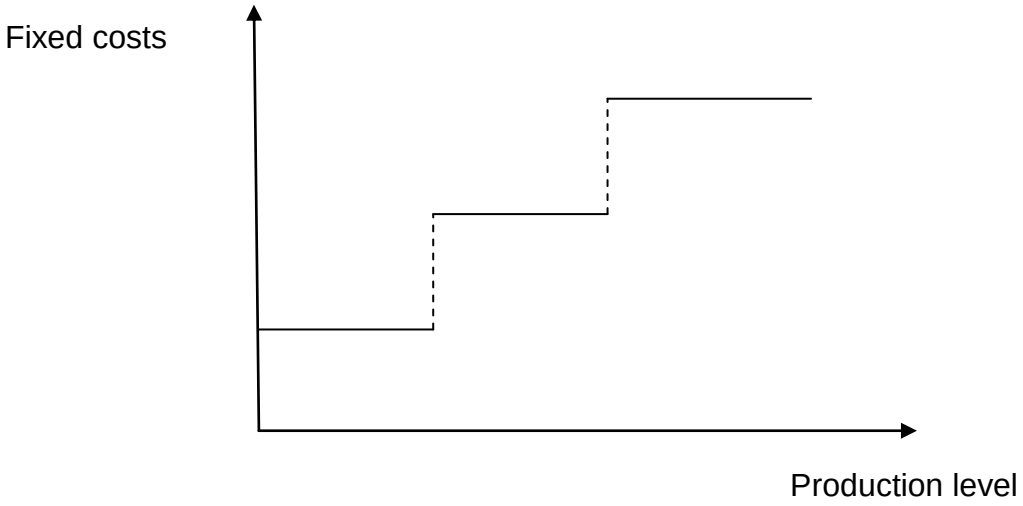

Fig. 2.6. **The behavior of fixed costs in the long-term period**

Mixed or semi-variable costs are costs which have fixed and variable elements. For example, a person working for a company may have a fixed salary but may also earn commission on sales. The behavior of these costs is presented in Fig. 2.7.

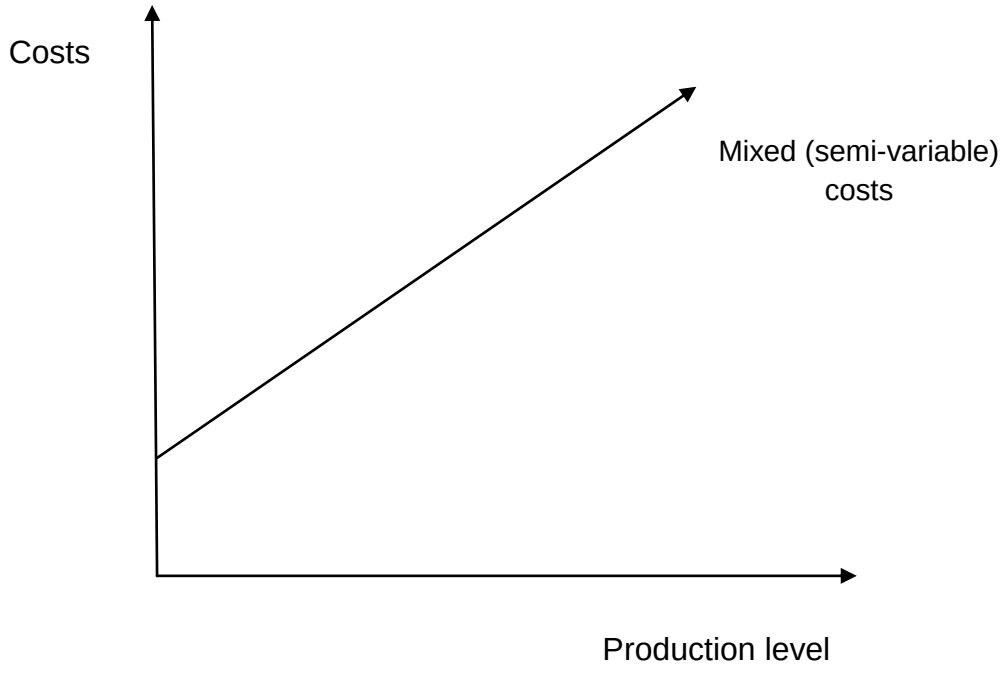

Fig. 2.7. **The behavior of mixed (semi-variable) costs**

To highlight fixed and variable costs it is necessary to determine the period of time when costs arise and it is necessary to determine the interval of the volumes of output. In order to manage fixed costs, apart from the volume of output, other factors must be taken into account, such as: production areas, the cost of fixed assets, the number of orders at the enterprise, the number of change-over of equipment and so on.

To identify the character of dependence of costs on the volume of production, special methods are used: the engineering method, Ordinary Least Squares, the visual control method, the interpolation method [17, p. 32].

In accordance with the third line of classification one should distinguish the group of costs, which help to create a system of control and timely response to deviations that arise in the process of operating activities.

Depending on the *place where costs arise* they are grouped in accordance with the production and organizational structure of the enterprise with the detalization from the workplace to the departments and the enterprise as a whole and in accordance with areas of responsibility.

According to the *objects of accounting,* costs are grouped for the purposes of cost management. The objects can be products or groups of similar products, responsibility centers, places where costs arise, types of activities etc.

For planning and control purposes depending on the *degree of adjustability,* costs are divided into three groups: completely regulated (fully adjustable), partially regulated and poorly regulated.

Completely regulated (fully adjustable) costs primarily occur in the production and distribution. These costs reflect a clear function of relationship between inputs and outputs of the production process (e.g. the cost of raw materials).

Partially regulated (discretionary) costs are costs that arise as a result of decisions periodically taken by the manager. There is no rigid connection between the input and output for these costs (e.g. advertising costs).

Poorly regulated costs are those which cannot be influenced in the short term, they are characteristic of all areas of activity.

The necessity of classification according to the degree of adjustability is primarily explained by the need to identify the relevant costs. Classification according to the degree of adjustability provides an opportunity to include costs to the relevant ones without interim grouping.

The degree of adjustability of costs is associated with the functional areas where costs arise. It is presented in Fig. 2.8 [17, p. 36].

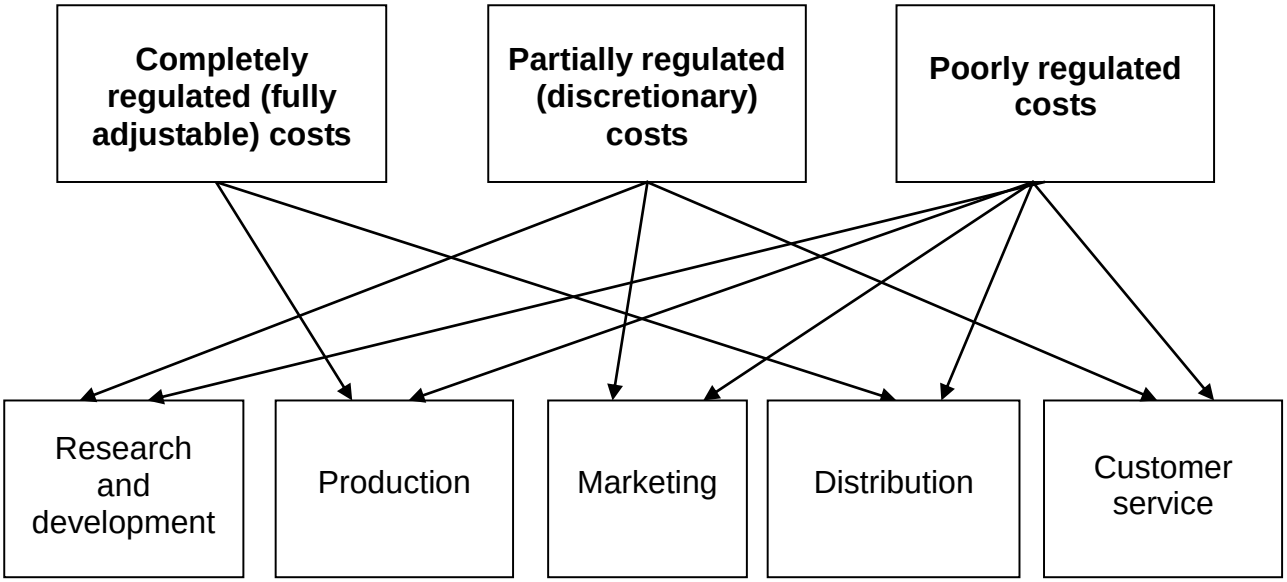

Fig. 2.8. **The functional areas where costs arise in different groups of adjustability**

Classification according to the degree of adjustability depends on the specifics of a particular enterprise, qualification of management personnel and therefore is always a bit subjective. The degree of adjustability will be different depending on the duration of the chosen period, of the powers of a person who makes a decision. All costs are regulated at a certain level of management.

In terms of control of activity of individual departments and assessment of the work of their managers the costs are divided into *controllable and non-controllable*.

A controllable cost is an expense that a manager has the power to influence. In other words, it is a cost that management can increase or decrease based on their business decisions. A controllable cost is just an expense that a manager has influence over. Control over costs is a relative term in the context of a business' hierarchy. Managers at different levels of the organization have different levels of influence and different amounts of power over spending and allocation of resources.

Noncontrollable costs, sometimes called uncontrollable costs, are expenses that a manager does not have power or authority to influence. Based on the company's hierarchy, some managers might have costs that are required to be paid out of their department, but they have no control over how much these costs are or when they need to be paid. Management or officers above a department might dictate these costs and hand them down the pecking order [37].

In the economic literature there are also other aspects of the classification of costs, for example, by the types of activity.

There are the following types of costs by activity:

costs of procurement activity;

production costs;

costs of sales activity;

costs of organizational activity.

Thus, classification of costs makes it possible to control the process of their execution, to determine whether the costs satisfy the needs of managers in creating a complete information system for management. Grouping of costs in different aspects is needed for identifying the reserves for reducing costs.

2.2. Responsibility centers, their classification

In the controlling system the information is accumulated and analyzed not only by the enterprise in general, but also by the responsibility centers.

A *responsibility center* is an organization unit that is headed by a manager who is responsible for its activities and results.

An organization unit can be considered a responsibility center if [43]:

it has a manager;

it has its own objectives guiding its activities;

the manager has control over the resources needed to pursue the objectives.

A decentralized environment results in highly dispersed decision making. As a result, it is imperative to monitor and judge the effectiveness of each manager. This is easier said than done. Not all departments (centers) can be evaluated on the same basis because some do not generate any revenue; they only incur costs in support of some necessary function. Other centers that deliver goods and services have the potential to be assessed on the basis of profit generation.

A part of an enterprise under the control of a manager is termed a "responsibility center". To aid performance evaluation it is first necessary to consider the specific character of each responsibility center. The logical method of assessment will differ based on the core nature of the responsibility center [53].

Managers must be held accountable for the results of their decisions and related execution. Without performance-related feedback, the business will not perform at its best possible level, and opportunities for improvement may go

unnoticed. Given that managers must be held accountable for decisions, actions, and outcomes, it becomes very important to align a manager's area of accountability with their area of responsibility. The area of responsibility can be a department, product, plant, territory, division, or some other type of unit or segment. Usually, the attribution of responsibility will mirror the organizational structure of the firm. This is especially true in organizations that have a decentralized approach to decision-making.

So, the purpose of accounting by the responsibility centers is generalization of data about costs and revenues for each center so that emerging deviations could be attributed to a particular person, but the main thing is to identify and timely solve various problems that appear during the activity.

Concerning the production process responsibility centers are divided into basic and functional. Basic centers organize control over the place where costs arise, functional centers provide cost control in many places under the influence of the basic center of responsibility.

There are the following types of responsibility centers, according to the nature of control over the inputs and outputs (Fig. 2.9):

cost or expense centers;

revenue centers;

profit centers;

investment centers.

Let us consider each type of responsibility centers.

A *cost center* is often a department within an enterprise. The managers of this center are responsible for its costs but are not responsible for revenues or investment decisions.

Manufacturer's cost centers include each of its production departments as well as the manufacturing service departments such as the maintenance department or quality control department. Other examples of cost centers include the human resource department, the IT department, the accounting department, and so on.

Cost centers are not limited to departments. There might be several cost centers within a department. For example, each assembly line could be a cost center. Even a special machine could be a cost center.

Cost centers can also be divided into regulated cost centers and partially regulated cost centers as presented in Fig. 2.9.

A revenue center is a division that gains revenue from product sales or services provided. The manager in the revenue center is accountable for revenue only (e.g., sales departments of an enterprise).

A *profit center* is a part of a corporation that directly adds to its profit. This is a section of a company treated as a separate business. Thus, profits or losses for a profit center are calculated separately. A profit center manager is held accountable for both revenues, and costs (expenses), and therefore, profits. What this means in terms of managerial responsibilities is that the manager has to drive the sales revenue generating activities which leads to cash inflows and at the same time control over the cost (cash outflows) causing activities. This makes the profit center management more challenging than the cost center management. Profit center management is equivalent to running an independent business because a profit center business unit or department is treated as a distinct entity enabling revenues and expenses to be determined and its profitability to be measured. Examples of typical profit centers are a store, a sales organization and a consulting organization whose profitability can be measured.

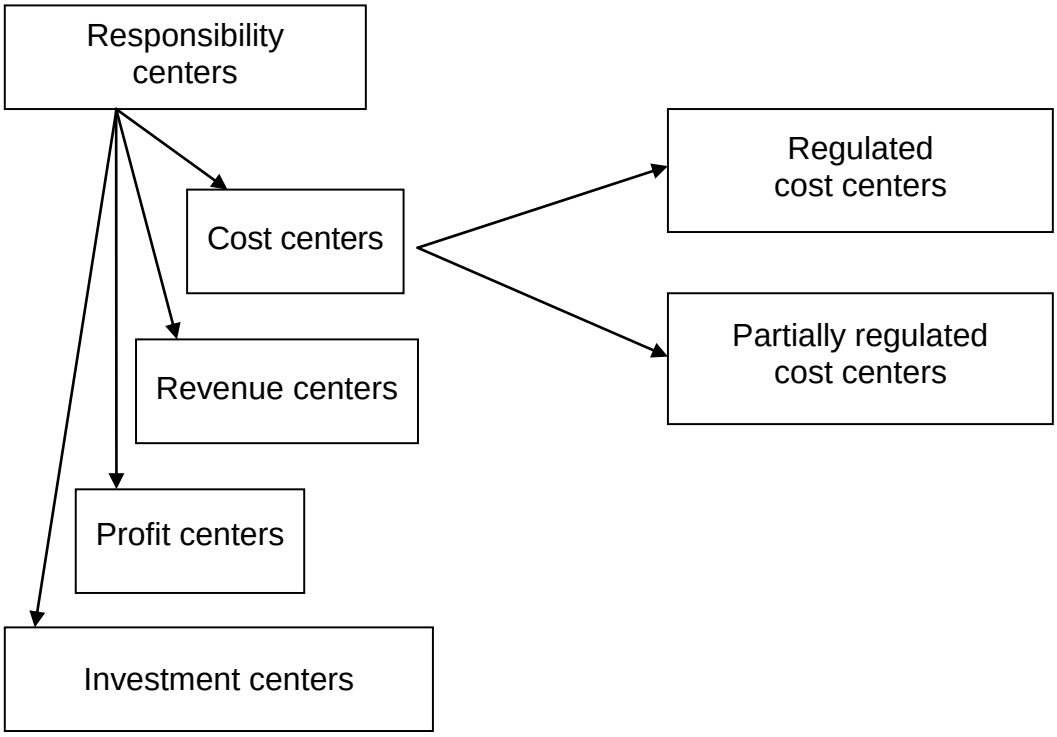

Fig. 2.9. **Types of responsibility centers** [17, p. 38]

An *investment center* is a classification element used for business units within an enterprise. The essential feature of an investment center is that it is treated as a unit which is measured against the use of capital, as opposed to a cost or profit center, which are measured against raw costs or profits.

The investment center takes care of revenues, costs and assets while the profit center deals just with revenues and costs and the cost center is only concerned with cost.

Responsibility centers at an enterprise can be formed based on the functional territorial principles, according to the organizational structure, according to the similarity of the cost structure [17, p. 40].

According to the functional principle there are several types of responsibility centers: *servicing, material, production, management, sales.*

Servicing centers provide services to other centers within the enterprise.

Material centers serve for procurement and storage of materials, they can be both basic and auxiliary.

Production centers are departments of basic and auxiliary production.

Management centers are management services of an enterprise.

Sales centers are engaged in product sales (sales department, marketing department).

In addition to distribution according to the functional principle, there are two variants of division of responsibility centers based on the territorial principle. According to the first principle, within a single responsibility center several functions are combined (for example, the company has several small offices of sales of products in different regions). According to the second principle, one functional area of activity is divided into several centers of responsibility (a company may have several big warehouses in different places of the region).

As a further development, functional centers may be divided on the basis of similarity of costs to be able to work with similar calculations or standards of costs.

Choosing the method of dividing a company into responsibility centers is determined by the specifics of a particular enterprise, by the product range or services sold, by the placing of customers and consumers. The following aspects should be taken into account: the structural units of business and their economic activity; the strategy of the company; the legal status of the structural units; the relationship of these units; the type of organizational and production structure of the units; the indicators which are used to measure the volume of activity and bases for cost allocation in departments; the sociopsychological factors when demarcation of areas of authority and responsibility of managers is done.

The division of an enterprise into responsibility centers makes enterprise management more effective and efficient.

Questions for self-study

1. Classification of company costs based on the types of its activities.
2. The economic nature of costs.
3. Factors which influence the choice of the type of responsibility center.
4. Variants of organization of responsibility centers within an enterprise.

Questions for self-assessment

1. What are the lines of classification of costs?
2. How are costs classified for decision making?
3. How are costs grouped depending on the volume of production?
4. What are the groups of costs according to the degree of adjustability?
5. What are the groups of costs according to the types of activities of a company?
6. What is a responsibility center?
7. How are responsibility centers grouped?
8. What is a cost center?
9. What is a revenue center?
10. What is a profit center?
11. What is an investment center?
12. Give a description of the functional responsibility centers.
13. How are the responsibility centers divided based on the territorial principle?
14. How are the responsibility centers divided on the basis of similarity of the cost structure?
15. What are the requirements for an enterprise to be divided into responsibility centers?
16. What does the phrase "different costs for different purposes" mean?
17. What is the difference between fixed and variable costs?
18. What is the behavior of variable and fixed costs per unit of output and the entire volume?
19. What is the difference between direct and indirect costs?

3. Management accounting as a basis of controlling

3.1. The essence and objectives of management accounting

The efficiency of operation of the enterprise is largely dependent on management activities that provide real economic independence, competitiveness, a stable market. A necessary condition for effective management is feedback between the object of management and the managerial subsystem. Accounting performs the role of feedback, by which control over the implementation of the planned parameters is established. Accounting characterizes the state of the system for certain periods of time and this makes it possible to carry out other management functions.

At an enterprise, the following types of accounting can be conditionally distinguished: manufacturing, financial and management accounting [12, p. 33].

Manufacturing accounting is collection of information on the results of production and production costs. This type of accounting includes material resources inventory, personnel records, cost accounting in different sections. In production accounting, first of all, operational accounting is distinguished, which reflects the state of the object of management in the short term (during a month). Manufacturing accounting only deals with the internal system of the company, without considering the external environment, and therefore does not provide complete information to make effective management decisions. It is considered as a source of cost data used in management and financial accounting.

Although *financial accounting* and *managerial (management) accounting* are closely related and work side by side, they are different in the following aspects [46]:

users: users of financial accounting information are people outside the organization such as stockholders, government, investors, etc. The users of managerial accounting information are people inside the organization, for example, managers and entrepreneurs;

time: financial accounting is mainly concerned with past business activities. Financial accounting is used to record the actual facts and figures of financial transactions. Although managerial accounting does involve the analysis of past business activities to evaluate departmental performance, it is also concerned with future planning and budgeting;

regulation: financial accounting practices are governed by GAAP (Generally Accepted Accounting Principles). Since financial accountants have to report

about the financial performance of the business to external users, therefore it is very necessary to enforce such regulations to provide correct information to people outside the organization. Managerial accounting is not governed by such rules and regulations;

requirement by law: registered companies are required by law to produce and publish financial accounting information. But managerial accounting is not mandatory by law. It is only required internally.

Comparative characteristics of management and financial accounting are presented in Table 3.1.

Table 3.1

The difference between management and financial accounting

Management accounting	Financial accounting
Reports to those inside the organization for planning, directing and motivating, controlling and performance evaluation	Reports to those outside the organization owners, lenders, tax authorities and regulators
Emphasis is on decisions affecting the future	Emphasis is on summaries of financial consequences of past activities
Relevance of items relating to decision-making is emphasized	Objectivity and verifiability of data are emphasized
Timeliness of information is required	Precision of information is required
Detailed segment reports about departments, products, customers, and employees are prepared	Only summarized data for the entire organization is prepared
Need not follow GAAP	Must follow GAAP
Not mandatory	Mandatory for external reports

Management accounting is the process of analysis, interpretation and presentation of accounting information collected with the help of financial accounting and cost accounting, in order to assist management in the process of decision-making, creation of policy and day-to-day operation of an organization. Thus, it is clear from the above that management accounting is based on financial accounting and cost accounting [55].

Management accounting is a key element of management. In particular it involves the identification, generation, presentation, interpretation and use of relevant information to help managers run their organisations. As such it involves the application of accounting and financial management to create, protect, preserve and increase value for the stakeholders of the organisation concerned [50].

The main functions of management accounting are:

providing information to management personnel at all levels for effective management decisions;

formation of information as a means of internal connections of various types of management accounting and various structural units of the same level;

operational control and evaluation of the performance of departments in achieving the main goal of an enterprise;

evaluation of the actual results as a basis for strategic planning.

Three aspects of business management are in the basis of management accounting: technology of business in general and a specific activity in particular, accounting policies of enterprise and financial accounting rules of specific activity, normative base of specific activity. On this basis, management accounting is formed as a system of organization, gathering, accumulation of data that are necessary to solve specific management problems.

Organization of management accounting is based on the following principles:

continuity of the enterprise activity;

applying uniform planning and accounting units that also can be objects of calculation;

close connection of management accounting with operational, technical and economic planning;

applicability and multiple use of primary and interim information;

the completeness and analyticity for the convenience of different types of analysis;

the periodicity, which involves providing the systematic management of information when it is necessary and appropriate, in accordance with the manufacturing and commercial cycles of the enterprise;

budgetary cost management at both the enterprise and unit levels;

formation of internal reporting indicators as the basis of communications in management accounting.

Thus, the *purpose* of management accounting is to help managers make the right management decisions in the process of economic activity: to predict and control costs and revenues, to choose better ways of enterprise development, to assist in strategic and operational management. Management accounting can be carried out by both the enterprise as a whole, and the units. The main *content* of management accounting is production cost accounting of future and past periods in various aspects of classification.

3.2. Cost accounting and cost calculation. Cost accounting methods and techniques

Cost management means essentially management of the whole operations of an enterprise, because it covers all aspects of production and business processes. Costs define and form the composition of the cost of production and services, and therefore must be considered accurately and reliably. The main intention of cost accounting is control over production activities at the enterprise and cost management in the process of its implementation.

Cost accounting is a set of actions aiming to reflect the processes of the enterprise that occur over a period of time by measuring, recording, grouping and analysis in the sections that form the cost of products and services. Such reflection provides obtaining complete information to enterprise management and evaluation of its activity by determining financial results. The purpose of cost accounting is the determination of costs, which are accounted for every single product or a single operation.

The main tasks of accounting at an enterprise are:

information support for management decisions taking into account their economic consequences;

observation and control over the level of actual costs, comparing them with the plans and norms in order to create economic strategy of an enterprise;

determining the costs of products and services to assess financial results.

The system of cost accounting for each enterprise is formed in different ways, and in general it depends on the choice of objects of cost accounting and objects of cost calculation that are defined by management objectives. An important point of the management accounting system is to consider the process of cost accounting of production and services as a unified accounting process. In this case the selection of cost accounting objects determines the system of indicators of internal reporting, the frequency of compilation of cost-information reports for various purposes of management.

A "cost accounting object" (cost object) is a managerial term for a product, process, department, or customer that costs originate from or are associated with. In other words, it is something that costs can be identified with and traced back to.

So, cost accounting is a system for recording data and producing information about costs for the products made by an organisation and/or the

services it provides. It is also used to establish costs for particular activities or responsibility centers.

Cost accounting involves a careful evaluation of the resources used within the enterprise. The methods (techniques) employed in cost accounting are designed to provide financial information about the performance of the enterprise and possibly the direction that future operations should take.

The information that is grouped by cost accounting objects (cost objects) must conform to requirements of management and is the basis for allocation of costs between unfinished goods and finished products as well as for the costing of total output and certain products and services.

Costing is one of the key element of management accounting. To help with the purposes of planning, control and decision-making, businesses often need to calculate a cost per unit of output. A key question, however, is what exactly we mean by a unit of output, or cost unit. This will mean different things to different businesses but we always look at what the business produces. For example: a car manufacturer will want to determine the cost of each car and probably different components as well; in a printing firm, the cost unit could be the specific customer order; for a paint manufacturer, the unit could be a litre of paint; an accountancy firm will want to know the costs incurred for each client (to help with this it is common to calculate the cost per hour of chargeable time spent by staff); a hospital might wish to calculate the cost per patient treated, the cost of providing a bed for each day or the cost of an operation [49].

Cost accounting includes the determination of the cost of production and services, costs of department, and control over cost reduction and analysis of their behavior. In cost accounting it is taken into account that costs for different purposes should be different. The costs of cost objects make it possible to determine the price of the product, work, services; which department is most effective in the use of resources; which of the processes used is the most economical; the largest contribution of a particular customer in profit etc.

There are three main methods (techniques) of cost accounting: full cost accounting (full-costing), also known as absorption costing, truncated (marginal) cost accounting (marginal costing), and Activity Based Costing (ABC).

Absorption costing (also known as "full absorption costing") is a managerial accounting cost method of expensing all costs associated with manufacturing a particular product. Absorption costing uses the total direct costs and overhead costs associated with manufacturing a product as the cost base. Generally accepted accounting principles (GAAP) require absorption costing for external reporting. This method of building up a full product cost which adds direct costs

and a proportion of production overhead costs by means of one or a number of overhead absorption rates.

Marginal costing (the alternative names for marginal costing are the contribution approach and direct costing) distinguishes between fixed costs and variable costs as conventionally classified. The marginal cost of a product is its variable cost. This is normally taken to be: direct labour, direct material, direct expenses and the variable part of overheads.

In accordance with this method variable costs are charged to cost units and the fixed costs of the period are written-off in full against the aggregate contribution. Its special value is in the decision-making.

Marginal costing has given birth to a very useful concept of contribution where contribution (contribution margin) is given by: sales revenue less variable cost (marginal cost). Contribution may be defined as the profit before the recovery of fixed costs. Thus, contribution goes toward the recovery of fixed cost and profit, and is equal to fixed cost plus profit. In case a firm neither makes profit nor suffers loss, contribution will be just equal to fixed cost. It is known as a break-even point.

The concept of contribution is very useful in marginal costing. It has a fixed relation with sales. The proportion of contribution to sales is known as P/V ratio which remains the same under given conditions of production and sales.

So, marginal cost varies directly with the volume of production and marginal cost per unit remains the same. It consists of prime cost, i.e. cost of direct materials, direct labor and all variable overheads and does not contain any element of fixed cost which is kept separate under the marginal cost technique.

The danger of using the marginal cost accounting is that a company can make a habit of setting prices based on a low contribution margin in order to undermine competition and increase sales.

Based on the analysis of variable and fixed costs of various types of products and services a company can reduce the contribution margin on one type of product and reimburse overhead costs due to the contribution margin of other types. They do so, for example, during recession with respect to prices of products, work and services. In this case price can be set at the level of marginal cost. It allows the company to stimulate demand and keep a minimum price. A product with a minimum contribution margin is called a loss-leader. Sales of products with a much lower contribution margin ratio (which shows the share of contribution margin in sales or in price) than that of other products can stimulate demand for

not only a loss-leader, but also for other profitable products. But in this case the plan of assortment of sales can fail and an excessive amount of loss-leaders will be sold.

Production of goods shall be determined by the order of their ranking by the contribution margin ratio. But a company can do so if it produces unlimited quantities. In fact, there are a number of factors that limit the output: throughput of equipment, production capacity, personnel, area. These factors are called key factors. In the presence of the limiting factor it is need to maximize contribution margin per unit of the limiting factor. Production of each type of products and services for satisfaction of demand must be made in order of decreasing profitability per unit of the limiting factor.

In foreign practice there are different terms used for this technique of costing. For example, in the UK, marginal costing is a popular term whereas in the US, it is known as direct costing and used in place of marginal costing. Variable costing is another name of marginal costing.

The principles of marginal costing are [51]:

1) for any given period of time, fixed costs will be the same, for any volume of sales and production (provided that the level of activity is within the relevant range). Therefore, in the case of selling an extra item of product or service the following will happen:

the revenue will increase by the sales value of the item sold;

the costs will increase by the variable cost per unit;

the profit will increase by the amount of contribution earned from the extra item;

2) similarly, if the volume of sales falls by one item, the profit will fall by the amount of contribution earned from the item;

3) profit measurement should therefore be based on the analysis of total contribution. Since fixed costs relate to a period of time, and do not change with increases or decreases in the sales volume, it is misleading to charge units of sale with a share of fixed costs;

4) when a unit of product is made, the extra costs incurred in its manufacture are the variable production costs. Fixed costs are unaffected, and no extra fixed costs are incurred when output is increased.

The main advantages and disadvantages of the marginal costing technique are presented in Table 3.2 [51].

Table 3.2

Advantages and disadvantages of marginal costing

Advantages	Disadvantages
• Marginal costing is simple to understand. • By not charging fixed overhead to the cost of production, the effect of varying charges per unit is avoided. • It prevents the illogical carry-forward in stock valuation of some proportion of current year's fixed overhead. • The effects of alternative sales or production policies can be more readily available and assessed, and decisions taken would yield the maximum return to business. • Practical cost control is greatly facilitated. By avoiding arbitrary allocation of fixed overhead, efforts can be concentrated on maintaining a uniform and consistent marginal cost. It is useful to various levels of management. • It helps in short-term profit planning by breakeven and profitability analysis. Comparative profitability and performance between two or more products and divisions can easily be assessed and brought to the notice of management for decision making	• The separation of costs into fixed and variable is difficult and sometimes gives misleading results. • Under marginal costing, stocks and work in progress are understated. The exclusion of fixed costs from inventories affect profit, and true and fair view of financial affairs of an organization may not be clearly transparent. • Marginal cost data becomes unrealistic in case of highly fluctuating levels of production, e.g., in case of seasonal factories. • Application of fixed overhead depends on estimates and not on the actuals and as such there may be under- or overabsorption of the same. • In order to know the net profit, we should not be satisfied with contribution and hence, fixed overhead is also a valuable item. A system which ignores fixed costs is less effective since a major portion of fixed cost is not taken care of under marginal costing. • In practice, sales price, fixed cost and variable cost per unit may vary. Thus, the assumptions underlying the theory of marginal costing sometimes becomes unrealistic. For long term profit planning, absorption costing is the only answer

So, it can be concluded that marginal costing can be most likely considered a technique of presentation of sales and cost data with a view to guiding management in decision making rather than as a method of costing.

The traditional technique (total cost or absorption costing technique) does not make any difference between variable and fixed cost in the calculation of profits. But marginal cost statement very clearly indicates this difference in arriving at the net operational results of a firm.

Marginal costing is the cost management technique for the analysis of cost and revenue information and for the guidance of management. The presentation of information through marginal costing statement is easily understood by all managers.

Thus, absorption costing and marginal costing are two different techniques of cost accounting. Absorption costing is widely used for cost control purposes whereas marginal costing is used for managerial decision making and control.

As has been said, one of the main methods (techniques) of cost accounting is Activity Based Costing (ABC).

Activity Based Costing is a costing method that has been developed to deal with the perceived weaknesses of traditional absorption costing.

Traditional absorption costing is based on the principle that manufacturing (production) overheads are driven by the level of production. This is reflected in the choice of activity level in the overhead absorption rate (OAR) calculation – typically, units, labour hours or machine hours. These all increase as the level of production increases. This was true in the past, because businesses only produced one simple product or a few simple and similar products. However, the following points are significant [47]:

1. Overheads used to be small in relation to other costs in traditional manufacturing.

In addition, production overheads, such as machine depreciation, were a small proportion of overall costs. This is because production was more labour intensive and, as a result, direct costs would have been much higher than indirect costs. A rough estimate of the production overhead per unit was therefore fine.

2. Overheads are now a larger proportion of total costs in modern manufacturing.

Manufacturing has become more machine intensive and, as a result, the proportion of production overheads, compared to direct costs, has increased. Therefore, it is important that an accurate estimate is made of the production overhead per unit.

3. The nature of manufacturing has changed.

Many companies must now operate in a highly competitive environment and, as a result, the diversity and complexity of products has increased.

Activity-based costing (ABC) is a method of assigning costs to products or services based on the resources that they consume. Activity Based Costing

first assigns costs to the activities that are the real cause of the overhead. It then assigns the cost of those activities only to the products that actually demand the activities.

The use of appropriate accounting methods allows the managers of an enterprise to make the right management decisions considering the fact that costs for different purposes will be different.

3.3. Allocation of overhead costs

The main problem in assigning costs to the objects of costing is the allocation of indirect (overheads) costs, because these costs relate to many accounting objects and they cannot be directly included in the cost of a particular object. Allocation of overhead costs is the basis for evaluation of departments' activities and closely associated with planning, accounting, analysis, control. Allocation allows managers to concretize the degree of communication of cost elements with production of individual products and services.

The main goals of allocation of overhead costs are [28, p. 274]:

economic decision making;

formation of pricing policy and calculation of profit for external users;

determining the connection between the object and the incurred costs;

motivation of personnel.

If all the goals cannot be achieved simultaneously, the most important goal is selected under specific conditions.

There are two types of overheads, which are administrative overheads (nonmanufacturing overheads) and manufacturing overheads. Administrative overheads include those costs that are not involved in the development or production of goods or services, such as the costs of front office administration and sales; these are essentially all overheads that are not included in manufacturing overheads. Manufacturing overheads are all of the costs that a factory incurs other than direct costs.

The costs of manufacturing overheads must be allocated to any inventory items that are classified as work-in-process or finished goods. The examples of manufacturing overheads are depreciation of factory equipment; factory administration expenses; indirect labor; indirect materials and supplies; maintenance, factory and production equipment; production employees' benefits; quality control and inspection; rent, facility and equipment; repair expenses; uncapitalized tools and equipment etc.

Traditionally overhead apportionment to products is made in the following three-step approach presented in Fig. 3.1.

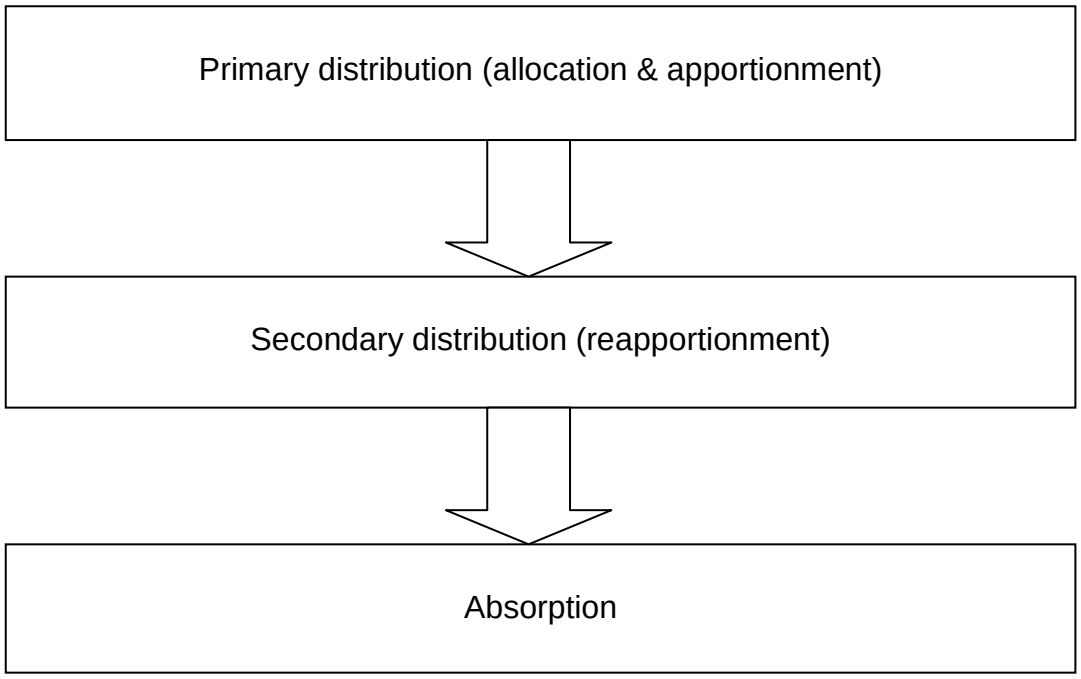

Fig.3.1. **The process of overhead apportionment to products**

Let us consider the specific features of all the stages (Fig. 3.1).

1. *Allocation and apportionment (primary distribution).* Primary distribution of overheads involves allocation and apportionment. Allocation of overheads is made when they are traceable to cost centers. Overheads are apportioned when they are not traceable to cost centers. Apportionment is made using the most suitable bases.

2. *Reapportionment (secondary distribution).* Reapportionment is a process where service center costs are transferred to production centers.

There are two types of cost centers:

production cost centers are cost centers where finished products are manufactured;

service cost centers are cost centers that support the production cost centers in the manufacture of a product (for example, stores, engineering, purchase etc.).

3. *Absorption.* It is the process of recovering overheads to the cost of products. In other words all the overheads allocated and apportioned to a department are finally absorbed by the units produced.

Absorption of overheads can be made based on some suitable basis. Some of the widely used methods of absorption are:

on the basis of production units;

as a percentage of direct labour cost;

as a percentage of direct material cost;

as a percentage of prime cost *(prime cost is equal to total direct materials cost plus direct labor cost);*

on the basis of direct labour hours (i.e. labour hour rate);

on the basis of machine hours (i.e. machine hour rate).

Overhead absorption rates (OAR) are determined based on any of the above methods. This rate is applied to individual cost units (products, services etc.) to derive the total overhead absorbed. To find the overhead rate, first determine the right basis that will best describe the behavior of the cost. Then, divide the total budgeted overhead by the basis to calculate the overhead rate:

$$\text{Overhead rate} = \text{Total budgeted overhead} / \text{Basis} \qquad (3.1)$$

There are many ways that can be used to determine the right basis for a given order. These bases are:

direct labor cost – this basis is used when manufacturing is labor intensive;

direct labor hours is used when workers are paid on the basis of their working hours;

prime cost is used when the factory produces only one kind of product;

machine time is used when manufacturing is mostly automated.

In order to find the overhead rate the same basis is used that has been chosen by multiplying this basis by the calculated rate. For example, if the labor hours are chosen to be the basis then the rate is multiplied by the direct labor hours in each task during the manufacturing process.

The formula for calculation of the overhead budget using the rate is as follows:

$$\begin{matrix}\text{The share} \\ \text{of the overhead}\end{matrix} = \text{overhead rate} \times \text{resources consumed} \qquad (3.2)$$

As has been mentioned, nonmanufacturing overhead costs are the business expenses that are outside the company's manufacturing operations. Since these costs are outside of the manufacturing function, they are not considered to be costs of products. As a result, the nonmanufacturing costs are not allocated to the products for determining the costs of inventory or the cost of

goods sold. Instead, the nonmanufacturing costs are immediately expensed in the accounting period in which they are incurred. That is why nonmanufacturing costs are period costs or period expenses.

While nonmanufacturing overhead costs are not allocated to the products, the company must have its selling prices and sales revenues sufficient to cover both the product costs and the period expenses in order to avoid a negative net income.

3.4. Cost accounting and cost calculation (costing) systems

All situations that arise in production cannot be always covered by typical planning and accounting systems, and therefore at each enterprise an accounting system is created to meet the leadership needs.

A cost accounting system (costing system) is a framework used by firms to estimate the cost of their products for profitability analysis, inventory valuation and cost control. Estimating the accurate cost of products is critical for profitable operations. A firm must know which products are profitable and which ones are not, and this can be only ascertained when the correct cost of the product has been estimated.

The system of cost accounting should reflect certain relationships of ways of formation of costs by the structure, content, destination, places of origin, responsibility centers, types of products and services. Regardless of the industry characteristics the cost accounting system must meet the reliable and objective assessment of business results and monitoring the progress of production.

Modern cost accounting and cost calculation (costing) systems help in determining the optimal prices for products, services; optimizing the assortment of products, determining, the purpose of upgrading the existing equipment and technologies; assessing the quality of work of management personnel; transfer of pricing.

Calculation (costing) and accounting are closely interrelated and interdependent: calculation of the cost of the final product (costing) is determined by the system and organization of accounting, and the degree of detail of accounting depends on the objectives of the calculation (costing).

Cost accounting and cost calculating (costing) systems are classified based on the following features [12]:

the objects of grouping: the job order and the process cost systems;

the degree of rationing (standardizing): the standard cost system and the actual cost system;

the complete coverage of costs: the full cost system and the system of partial costs (Direct Costing).

The use of cost accounting and cost calculation (costing) systems is determined by the purposes of management, by the objects of planning and accounting, the technology of creation of products and by other factors.

Most often three costing and accounting systems are used: the job order, the process cost system, the standard cost system.

The *job order cost system* provides a separate record for the cost of each quantity of product passing through the factory. The quantity of each particular product is called the order. The job order cost system fits better in the industries that develop products that have different specifications most of the time or that have a wide variety of products in stock. Many service companies use this type of system for costing orders by accumulating the costs associated with providing services to their customers.

Some characteristics of the process cost systems are: they accumulate costs by departments, production is continuous and homogeneous. This system is used, for example, in food processing, paper processing, oil refinery, production of soft drinks, medicines, toys etc.

The comparative characteristic of these systems is presented in Table 3.3 [57].

Table 3.3

The difference between the job order costing and process costing

Attribute	Job order costing	Process costing
Uniqueness of product	Is used for unique products	Is used for standardized products
Size of job	Is used for very small production runs	Is used for large production runs
Record keeping	Much more record keeping is required, since time and materials must be charged to specific jobs	Aggregates costs, and so requires less record keeping
Customer billing	Is more likely to be used for billings to customers, since it details the exact costs consumed by projects commissioned by customers	Is less likely to be used for billings to customers

In situations where a company has a mixed production system that produces in large quantities but then customizes the finished product prior to shipment, it is possible to use elements of both the job costing and process costing systems, which is known as a *hybrid system* [57]. Hybrid costing is most commonly used in situations where there is identical processing of a baseline product, as well as individual modifications that are made beyond the baseline level of processing. For example, this situation arises when identical products are manufactured until they reach the painting operation, after which each product receives a different coating, with each coat having a different cost. The key issue in choosing to use a hybrid system is whether certain parts of the production process are more easily accounted for under a different system than the one used by the bulk of the manufacturing operation. Many companies do not realize the fact that they are using a hybrid costing system – they have simply adapted their cost accounting systems to the operational requirements of their business models.

A *Standard Costing system* is a tool for planning budgets, managing and controlling costs, and evaluating cost management performance.

A Standard Costing system involves estimating the required costs of a production process. Before the beginning of the accounting period, standards are determined and set regarding the amount and cost of direct materials required for the production process and the amount and pay rate of direct labor required for the production process. These standards are used to plan a budget for the production process. At the end of the accounting period, the actual amounts and costs of direct material used and the actual amounts and pay rates of direct labor utilized are compared to the previously set standards. Comparing the actual costs to the standard costs and examining the variances between them allows managers to look for ways to improve cost control, cost management, and operational efficiency.

The primary advantages to using a Standard Costing system are that it can be used for product costing, for controlling costs, and for decision-making purposes. The disadvantages are that implementing a Standard Costing system can be time consuming, labor intensive, and expensive. Also, the standards often have to be updated if the cost structure of the production process changes [32].

One of the cost accounting and cost calculating (costing) systems which is applied in the market economy is a system of calculation by the variable (direct) costs, which is called *Direct Costing*. The system is based on the fact that all costs are divided into variable direct and fixed indirect ones. This differentiation

of costs makes it possible to determine the dependence of profit on sales and cost control.

The essence of the Direct Costing system is that direct variable costs are directly attributed to the types of finished products, indirect fixed costs are collected and written off at overall financial results of the reporting period in which they arise. This system of costing sets an unchanged amount of fixed costs in any output.

Finished goods and work in progress are estimated in this system only by the variable costs. The system is focused on sales. The more sales, the more profit can be obtained at a constant value of overhead.

The system provides control over the fixed costs, control of contribution of each product and services to making a profit in compliance with the range of products produced. Calculation by this system identifies uncontrollable costs by responsibility centers, the difference between profitable and unprofitable operations provides for taking into account the behavior of costs in relation to standards. Based on direct costs it is possible to more correctly set prices for products.

The main disadvantage of the system is the difficulty in determining the fixed costs, the need for additional calculations which do not always provide reliable results, incomplete information required for making strategic decisions. As practice shows not all fixed costs are reimbursed in a short period of time and therefore in making strategic decisions it is appropriate to use the full cost.

The next system of calculation (costing) and accounting is the system based on activities. It is called *Activity Based Costing.* The system is used in strategic and operative controlling.

Activity Based Costing (ABC) provides assigning costs first to activities and then to the products based on each product's use of activities. An activity is any discrete task that an organization undertakes to make or deliver a product or service. Activity-based costing is based on the concept that products consume activities and activities consume resources. The steps of activity-based costing are presented in Fig. 3.2 [39].

The first step is identifying the activities (such as processing orders) that consume resources and assigning costs to them.

The second step is identifying the cost driver(s) associated with each activity. A cost driver causes, or "drives" an activity's cost (for the order-processing activity, the cost driver could be the number of orders).

The third step is computing a cost rate per cost driver unit or transaction. The cost driver rate could be the cost per order, for example.

The fourth step is assigning costs to products by multiplying the cost driver rate by the volume of cost driver units consumed by the product.

Activity Based Costing assigns overhead costs to products in a more logical manner than the traditional approach and creates a basis for effective decision-making.

One of the effective concepts of costing which was proposed by Japanese specialists is *Target Costing.* Target Costing involves setting a target cost by subtracting a desired profit margin from a competitive market price. Japanese companies have developed Target Costing as a response to the problem of controlling and reducing costs over the product life cycle.

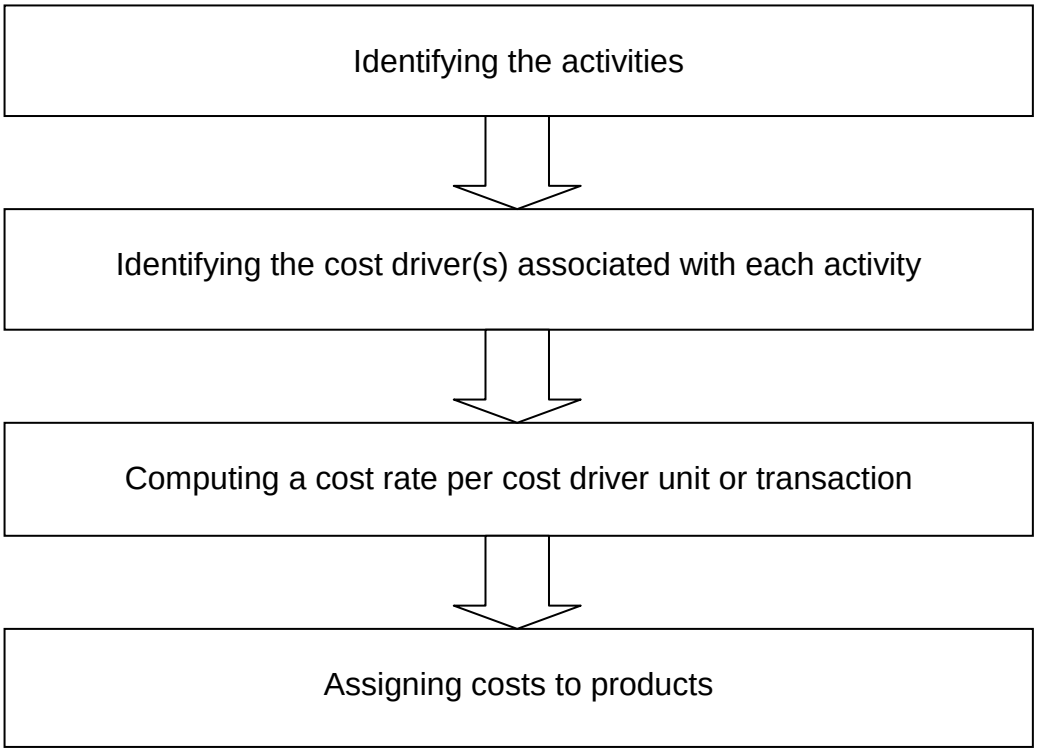

Fig. 3.2. **The steps of Activity Based Costing**

Target costing is a disciplined process for determining and achieving a full-stream cost at which a proposed product with specified functionality, performance, and quality must be produced in order to generate the desired profitability at the products anticipated selling price over a specified period of time in the future. It means that: products should be based on an accurate assessment of the wants and needs of customers in different market segments, and cost

targets should be what results after a sustainable profit margin is subtracted from what customers are willing to pay at the time of product introduction and afterwards. The main objective of Target Costing is very straightforward. It is to enable management to manage the business to be profitable in a very competitive marketplace. Thus, Target Costing is a proactive cost planning, cost management, and cost reduction practice whereby costs are planned and managed out of a product and business early in the design and development cycle, rather than during the latter stages of product development and production.

Japanese specialists suggested a cost reduction system, which is called *Kaizen costing*. While target costing is a critical means of managing the costs in a new product design and development stage. Kaizen costing supports continuous improvement activities in the manufacturing phase. It is an alternative to ABC and combined with target costing Kaizen costing helps Japanese manufacturers accomplish their objective of cost reduction in the full cycle of the design-development-production cycle.

In contrast to the standard cost accounting system, where focus is on meeting standards, Kaizen costing mandates the setting of a cost reduction target amount and the attainment of the target amount through continuous improvement activities. These improvement activities, which should lead to cost reductions, are clearly specified for each organizational unit and for each accounting period.

So, the cost accounting systems can be important sources of information for the managers of an enterprise. The objective of a cost system or costing system is to accumulate the costs of goods or services. The information on the cost of a product or service is used by managers to set the prices of the product, control operations, and develop financial statements. Also, the cost system improves control by providing information on the costs incurred by each department or manufacturing process.

Questions for self-study

1. Management accounting as a new approach to the cost and profit management in a company.
2. The procedure of calculating the rate of allocation of overhead costs for some cost centers.
3. Overhead cost distribution between manufacturing and service departments.
4. Redistribution of overhead costs of service departments to manufacturing departments.

Questions for self-assessment

1. What is the essence of management accounting in the controlling system?
2. What are the differences between management accounting and financial accounting?
3. What is the essence of cost accounting?
4. What are the functions of management accounting?
5. What are the methods of cost accounting?
6. What for are cost accounting and cost calculation (costing) systems used?
7. Give a description of the job order cost system.
8. Give a description of the process cost system.
9. Expound the essence of Standard Costing.
10. Expound the essence of Direct Costing.
11. What is the essence of the contribution margin? How is it calculated?
12. How are overhead costs classified?
13. What bases are used for allocation of overhead costs?
14. How is the base for allocation of overhead costs chosen?
15. What is the essence of Activity Based Costing (ABC)?
16. What is the essence of Target Costing?
17. What is the essence of Kaizen costing?

Part 2. Management decision making in controlling

4. Budgeting as a tool of controlling

4.1. The goals and objectives of budgeting

Implementation and detalization of strategic plans of an enterprise is carried out using budgeting, which determines short-term goals within the overall strategy. Budgeting is considered to be a basis of operative and strategic controlling, which allows managers to previously evaluate the effectiveness of management solutions, optimally allocate available production resources, choose the direction of development of the enterprise. It encourages management to plan, develop control criteria, improve coordination of the enterprise activities.

Budgeting allows managers to predict the sales potential of the enterprise, to control costs in accordance with the expected income, to determine the most

efficient way to use resources, covering all aspects of the enterprise financial and economic activity.

So the entire planning and control process of many companies is built around budgets.

A *budget* is a plan that outlines an organization's financial and operational goals. So a budget may be thought of as an action plan. Enterprises often use special types of budgets to assess specific areas of operation.

A budget is a detailed plan for acquiring and using financial and other resources over a specified period of time. It represents a plan for the future expressed in formal quantitative terms. *Budgeting* is the act of preparing a budget.

Budget can be prepared per year, per quarter, per month.

The main advantages and disadvantages of budgeting are presented in Table 4.1.

Table 4.1

Advantages and disadvantages of budgeting

Advantages	Disadvantages
• Budgets provide a means for communicating management's plans through the enterprise. • Budgets force managers to think about and plan for the future. In the absence of the necessity to prepare a budget, many mangers would spend all of their time dealing with daily emergencies. • The budgeting process provides a means for allocating resources to those parts of the enterprise where they can be used most effectively. • The budgeting process can uncover many potential bottlenecks before they occur. • Budgets coordinate the activities of the entire enterprise by integrating the plans of the various parts of the enterprise. Budgeting helps to ensure that everyone at the enterprise is pulling in the same direction. • Budgets provide goals and objectives that can serve a benchmark for evaluating subsequent performance	• Budgets can be seen as pressure devices imposed by management, thus resulting in: bad labor relations, inaccurate record-keeping. • Departmental conflict arises due to: disputes over resource allocation, departments blaming each other if targets are not attained. • It is difficult to reconcile personal/individual and corporate goals. • Some costs are under the influence of more than one person (responsibility versus controlling). • Managers may overestimate costs so that they will not be blamed in the future should they overspend

The main objectives of budgeting are:

planning financial and economic activities for a certain period;

optimization of costs and profits;

coordination and cooperation of enterprise departments;

providing basis for evaluation and control of implementation of plans;

motivation of managers to focus on achieving the ultimate goal;

ensuring compliance with contracts.

The procedures for planning, accounting, control and analysis, regulation and the budget documentation and procedures forming the *budgetary system* provide managers with reliable information needed to predict deviations from the set goals and take appropriate regulatory action. Budgeting helps enterprises determine their status in the market, predict the sales potential, if necessary, connect available resources, control costs during the current year in accordance with expected revenues.

The achievement of budgeting goals is possible subject to the basic principles [8, p. 257]:

1. The budgetary system must cover the totality of the enterprise activities.

2. The formats of budgets and grouping of indicators must reflect the system of power and the division of responsibilities at an enterprise.

3. Accurate identification of responsibility must not harm the required community of interests of the units.

4. The budgetary system should fit into the overall policy of the company.

5. The budgetary system should be agreed with the policy of personnel management.

6. The forecasts that are used in the budgetary system must be refined as the emergence of new information.

Units responsible for the preparation of budgets are called *budget centres*. A budget centre may encompass several cost centres.

The budgeting process usually includes six stages which are presented in Fig. 4.1 [12, p. 69].

In domestic and foreign practice there are a number of different approaches to budgeting, including the following [48]:

incremental budgeting. An incremental budget starts with the previous period's budget or actual results and adds (or subtracts) an incremental amount to cover inflation and other known changes. It is suitable for stable businesses, where costs are not expected to change significantly. There should be good cost control;

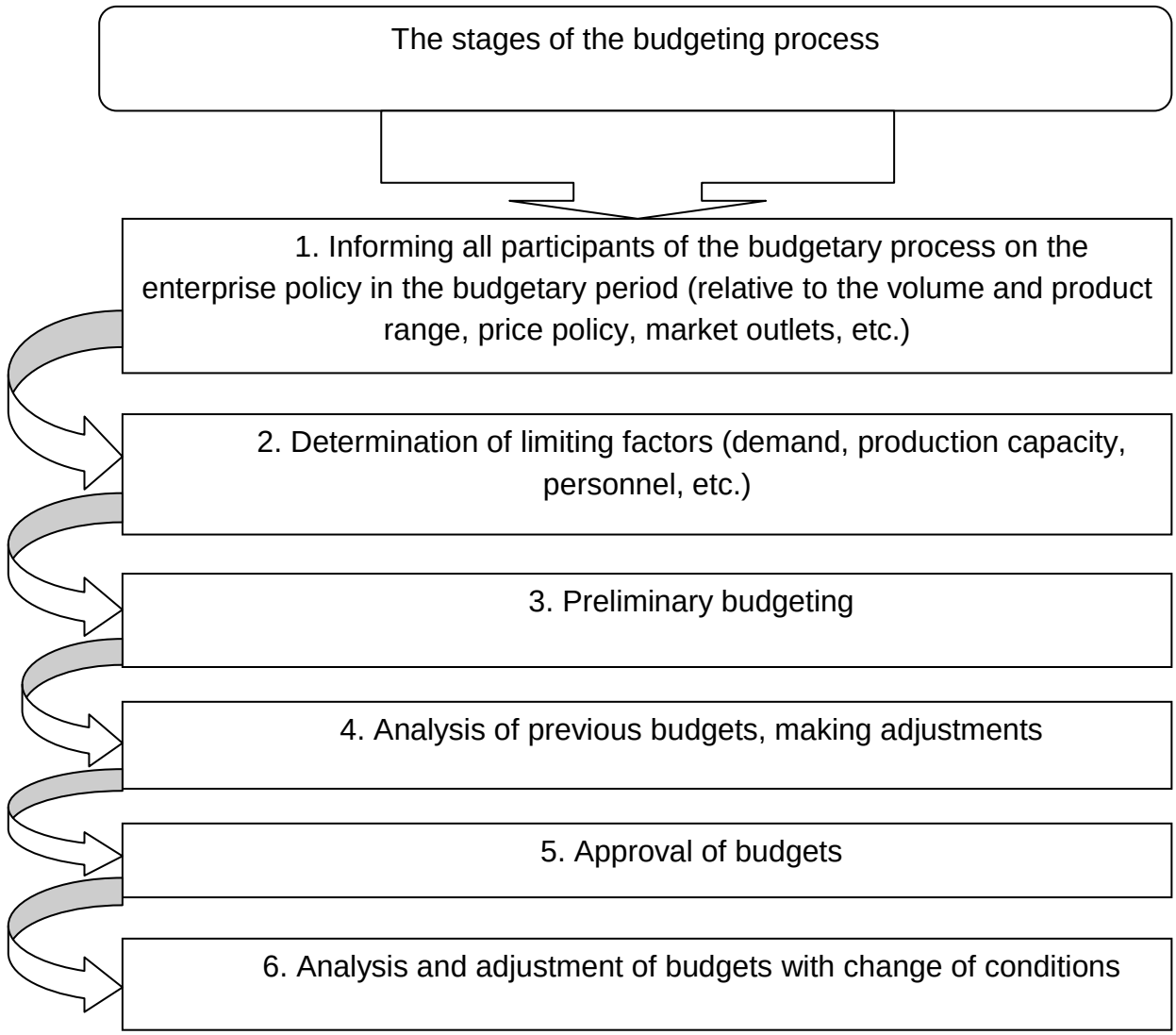

Fig 4.1**. The budgeting process**

zero-based budgeting (ZBB). A method of budgeting that requires each cost element to be specifically justified, as though the activities to which the budget relates were being undertaken for the first time. Without approval, the budget allowance is zero. It is suitable for: allocating resources in areas were spending is discretionary, i.e. nonessential (for example, research and development, advertising and training); public sector organisations such as local authorities;

activity-based budgeting (ABB). Activity based budgeting is an approach to budgeting that relies on cost drivers and is closely related to activity based costing. ABB is defined as: a method of budgeting based on an activity framework and utilising cost driver data in the budget-setting and variance feedback processes. Or, put more simply, preparing budgets using overhead costs from activity based costing methodology;

kaizen budgeting (the Japanese technique*)* is a budgeting approach that projects costs on the basis of future improvements, rather than current practices and methods. The key point is that the budget cannot be achieved unless improvements are made. Kaizen, in Japanese, means "continuous improvement", that is "changing for the better".

Another approach which is currently being used is *beyond budgeting.* Beyond budgeting is an approach to budgeting that tries to resolve the weaknesses and limitations of traditional approaches to budgeting.

Beyond budgeting is a leadership philosophy that relates to an alternative approach to budgeting which should be used instead of traditional annual budgeting. The main characteristics of this approach are [48]:

rolling budgets, produced on a quarterly or monthly basis, are suggested as the main alternative to annual budgeting. These are flexible, do not rely on obsolete figures and should result in more timely allocation of resources;

the rolling forecasts will embrace KPIs (Key Performance Indicators) based on the balanced scorecard which is linked to the organisation strategy. Managers' performance measures will be based on this;

the budget may also incorporate benchmarking linking managers' targets to external benchmarks without focusing on the past performance;

the focus of efforts is on managing future results rather than explaining past performance;

allowing operational managers to react to the environment;

encouraging a culture of innovation.

4.1. Types of budgets in a company

The main budget of a company is master budget, which covers general activities of the company. The master budget is the aggregation of all lower-level budgets produced by a company's various functional areas. It also includes budgeted financial statements, a cash forecast, and a financing plan. The master budget is typically presented in either a monthly or quarterly format, and usually covers a company's entire fiscal year. It includes operating and financial budgets.

Operating budget is a detailed projection of all estimated income and expenses based on forecast sales revenue during a given period (usually one year). It generally consists of several sub-budgets, the most important one being the sales budget, which is prepared first. This is followed by the projected cost of goods sold budget, the inventory and purchasing budget, and the budget for operating expenses.

Financial budgets focus on cash and capital expenditures. They are used to make sure that the business has the cash it needs to fund its operations and to maintain and/or upgrade its buildings and equipment. It is a plan including a budgeted balance sheet, which shows the effect of planned operations and capital investments on assets, liabilities, and equities. It also includes a cash budget, which forecasts the flow of cash and other funds in the business. Cash budgeting (cash planning) is a critical part of budgeting because it is essential to have the right sums of cash available at the right times.

Operating budgets are prepared first as information from the operating budgets is needed for the financial budgets.

Depending on the method of development, budgets are static, rolling and flexible.

Static (fixed) budgets are prepared for one level of activity, usually around the forecasts made for sales.

Rolling (continuous) budgets are continually updated by periodically adding a new incremental time period and dropping the period just completed.

Flexible budgets are a series of fixed budgets set to different levels of sales activity within which the organisation may operate.

Since the flexible budget restructures itself based on activity levels, it is a good tool for evaluating the performance of managers – the budget should closely align to expectations at any number of activity levels. It is also a useful planning tool for managers, who can use it to model the likely financial results at a variety of different activity levels.

Preparation of the master budget begins with a lower level of management: for sections, departments, services, shops. Further, these budgets are consistently compiled and coordinated at the highest level of management. Development of the master budget is characterized by considerable complexity and a large volume of work of various departments of the calculation, justification, generalization and coordination of various indicators.

Master (comprehensive) budget includes:

sales budget;

production budget;

direct materials budget;

direct labor budget;

manufacturing overhead budget;

selling and administrative budget;

capital acquisitions budget;

cash receipts and disbursements budget;
budgeted income statement;
budgeted balance sheet (Fig. 4.2).

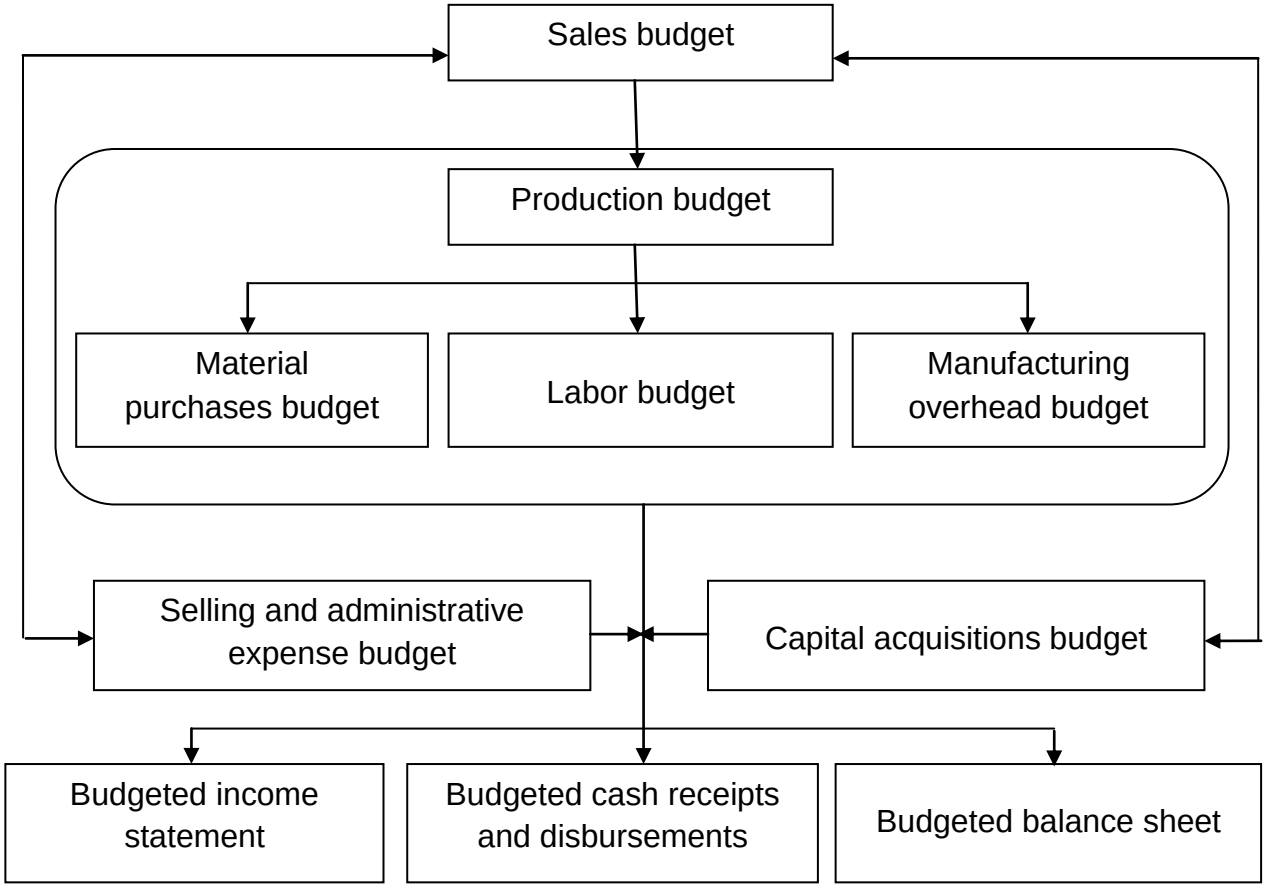

Fig. 4.2. **The composition of the master (comprehensive) budget**

Let us consider each types of budgets in the process of development of a master budget (Fig. 4.2).

Sales budget is the first step. It comes first because other budgets cannot be prepared without an estimate of sales. For example: production estimates are based on forecast sales. Companies use a variety of methods to estimate sales: econometric models, previous sales trends, statistics information, sales force estimates.

Production budget follows from the sales with taking into account the stocks of finished products. Production forecasts are based on the following relationships:

Finished units to be produced = expected sales in units + desired ending inventory of finished units – beginning inventory of finished units.

Direct material purchases budget shows budgeted beginning and ending direct material inventory, the quantity of direct material that will be used in production, the amount of direct material that must be purchased and its cost during a specific period.

Direct material purchase budget is developed based on direct materials budgets. Direct materials budgets depend on: the amount needed for production; the amount needed for ending inventory. The following calculations are used:

Required purchases of direct materials = amount required for production + + desired ending inventory of direct materials – beginning inventory of direct materials.

Direct labor budget shows the total direct labor cost and the number of direct labor hours needed for production. It helps the management to plan its labor force requirements. Direct labor budget is calculated by multiplying: the number of units to be produced × labor hours per unit × rate per hour.

Manufacturing overhead budget shows all of the planned manufacturing costs which are needed to produce the budgeted production level of a period, other than direct costs which are already covered under direct material budget and direct labor budget. The overhead budget is an operational budget contained in the master budget of a business. It has two sections, one for variable overhead costs and another for fixed overhead costs.

Based on direct material purchases budget, direct labor cost budget and manufacturing overhead budget the *cost of goods manufactured budget* is created. Cost of goods manufactured budget is also an operational component of master budget. It is prepared to calculate the manufacturing costs that are expected to be incurred on budgeted finished goods.

Selling and administrative expense budget is a schedule of planned operating expenses other than manufacturing costs. It is prepared by all types of businesses (i.e. manufacturers, retailers and service providers) before the preparation of budgeted income statement. It is usually divided in two sections: the selling expenses and the administrative expenses. Selling and administrative expense budgets include: salaries, advertising, office expenses, other general expenses.

Capital acquisitions budget provides acquisitions of capital assets such as: property, plant, equipment. They must be carefully planned because they consume substantial cash reserves.

A *budgeted income statement* is simply a predicted income statement for a future period of time, and is also called a pro forma income statement.

An income statement for a business reports its earnings and expenses for a given period of time, typically for a month, quarter or year.

Managers plan *cash receipts and disbursements budget (cash budget)* for the amount of cash flows and the timing of cash flows. It is a very important budget because the timing of cash inflows and outflows may diverge substantially from the income statement.

Budgeted balance sheet is the last component of the master budget. It is a function of all of the other budgets. The budgeted balance sheet is developed by beginning with the current balance sheet and adjusting it for the data contained in other budgets. The budget is used to assess the effect of planned decisions on future financial position.

4.3. Budgetary control

The compiled budget reflects indicators to be achieved in the budget period. However, in the process of economic activities variances of actual indicators from the budget arise. For early detection of variances and responses to them budget control is carried out.

Budgetary control is a continuous comparison of actual results with budgeted results to ensure that the objectives of the company's policy are achieved or to provide a basis for the change of those objectives. In simple terms, it is the analysis of the plans which the organisation has made; what was the result when those plans were implemented practically. After practical implementation of the budget if any variation is seen in the actual result compared to the budget result the reasons for the variations are found out and corrective actions are taken [56].

There are typically four steps in any budgetary control process that managers follow [41]:

1. A budget needs to be created. To put it simply, a company performance budget is really just a set of financial goals that management wants to achieve. These could be sales or spending goals.

2. Second, after the budget has been created, management needs to compare, analyze, and interpret the actual performance results with the budgeted goals. Management typically uses a budget report for this comparison.

3. After the comparison has been made, managers need to improve the underperforming operations and continue to strengthen the favorable ones. The budget report easily allows managers to focus on unfavorable operations because all areas that meet the budget are marked with "favorable" for favorable

variance while the poorly performing areas are marked with "unfavorable" for unfavorable variance.

4. After the management has had a chance to look over the entire last period, they can start making plans for the next year. For example, they will most likely review the original budget that was created and why certain goals were set. Then they will compare the actual and budgeted performance over the entire period. Lastly, the management will focus on how they tried to correct the problem operations and develop a plan to fix them in the next period.

Positive (favorable) variances are when the actual revenue exceeds the planned one and the actual costs are less than the budgeted ones. The negative (unfavorable) variances are a deviation when the actual income is less than the planned one or the actual costs are greater than the budgeted ones. The response to the deviation depends on their values and causes. Slight variances can be ignored, significant variances should be examined in detail with additional information.

Thus, the task of budgetary control is to attract the management's attention to significant variances that require detailed analysis.

The most possible causes of variances in the reporting period include: changes in prices, wage rates, the efficiency of the resource use, overtime hours, changing suppliers, product range, poor control of inventory, spoilt products, out-of-date equipment, and others.

Depending on the causes, variances are divided into two groups [5, p. 268]:

as a result of planning – they are related to errors and incorrect forecast when planning, pricing, costing was made;

as a result of the enterprise activity – they arise as a result of personnel actions or certain events (changes in demand, price fluctuations, etc.).

In case of significant variances, depending on the causes, there are two alternative solutions: adjusting the budget if it was performed inappropriately and adjustments of actions to achieve the goal.

Budget control provides feedback in the enterprise management system and enables management to implement control of the variances (management by exception). *Management by exception* is a concept implying that managers only look at the areas that have large variances from the standard or budgeted projections.

Budget control makes it possible to effectively manage the activities of the enterprise (organization), provides a basis for taking right action in the future.

The planned budget is static because it reflects the income and expenses which are calculated based on the expected (planned) volume of activity. Because

the revenue and part of costs depend on changes in the volume of activity, in the case where the actual volume differs from the planned one, the variances from the static budget lose their control values. Therefore it is necessary to adjust the budget data on the basis of the actual volume of activity. For this purpose a flexible budget is used. When using a flexible budget the total variances are divided into variances from the flexible budget and variances due to the activity.

Deviations provide for evaluation of activities of the enterprise from the viewpoint of efficiency and effectiveness. The *efficiency* shows the relationship between resources and results achieved (receiving or increasing profit). *Effectiveness* is the degree of achievement of goals (implementation of the plan in physical and monetary terms).

Variances from the flexible budget characterize the efficiency of the enterprise activity, and the variances from a sales volume characterize its effectiveness. For detailed elaboration of deviations their causes should be considered, comparing data of flexible and static budgets.

Thus, the use of budgeting as a new management technology allows managers to monitor the impact of the results of activity on the financial equilibrium of the enterprise with distribution of responsibility for the functioning of individual units and the extent of their actions on the final results. Budgeting provides an assessment of the company's condition by responsibility centers, accurately delineates the responsibility for economic indicators by activities, by structural departments.

Questions for self-study

1. Approaches to budgeting in different types of responsibility centers.
2. Methods of analysis of deviations of the actual results from the planned ones.

Questions for self-assessment

1. What are the goals and objectives of budgeting at an enterprise?
2. What elements are included into the company system of budgets?
3. What are the stages of the budgeting process?
4. What is a master budget? What elements does it include?
5. What are the components of the operating budget?
6. What are the components of a financial budget?

7. How are the approaches to budgeting classified?
8. What is a static budget?
9. What is a flexible budget?
10. What is a rolling budget?
11. What are the advantages and disadvantages of budgeting?
12. What is the budgetary control and management by variances (management by exception)?
13. What is the essence of the incremental budgeting approach?
14. What is the essence of zero-based budgeting?
15. What is the essence of activity-based budgeting?
16. What is the essence of the kaizen budgeting approach?
17. What is the essence of the beyond budgeting approach?

5. Investment project controlling

5.1. The goals and objectives of investment controlling

One of the main conditions for effective implementation of business is its viable investment projects, which causes special importance of investment controlling. Thus, the main goal of investment project controlling is achieving the objectives of the enterprise in the direction of investment activity. The object of investment controlling is investment projects.

The main activities of investment project controlling are [8; 17; 18]:

planning and coordination of investment activity within the strategic planning at an enterprise;

initiating new investment projects and development of proposals for their implementation, first of all this applies to new investment projects that provide long-term potential for success;

implementation of investment, project support (project controlling);

control of the budget of the investment project;

control over the implementation of investment projects, which includes current control calculations.

Thus, investment project controlling includes:

controlling of the decision-making process on the selection of priority projects at the stages of research and evaluation;

controlling of the implementation of the investment project.

The objectives of controlling of the decision-making process on the selection of priority projects at the stages of research and evaluation are:

analysis of the methods of planning investment projects;

development of means for planning investment;

checking and control of investment applications;

development of a system of criteria to assess and compare the efficiency of the investment projects;

economic analysis of plans and budgets of the investment projects.

The objectives of controlling of the implementation of the investment project are:

monitoring current information and current control of actions on the project implementation;

analysis of changes in the external environment and assessing their impact on project implementation;

analysis and assessment of changes in the internal environment;

adjusting plans of the investment project according to the changes that occurred in the internal or external environment;

control of conformity of project implementation to its content;

control of conformity deadlines of the project;

identification and analysis of the causes of deviations from the plan;

control and analysis of implementation of the investment budget, variances from it;

evaluation of the project efficiency, taking into account changes in the internal and external environment, the existing plan and budget variances;

development of recommendations for decision-making.

Creating a system of investment controlling at the enterprise provides the implementation of the stages presented in Fig. 5.1 [17].

Let's consider each stage of this process.

The first stage is the selection and justification of the investment project according to the objectives and business strategy. At this stage, it is important to establish project objectives, identify the nature and degree of the influence of the factors of external and internal environment on the achievement of the set goals. The objectives of an investment project can be: making profit, increasing prosperity of shareholders, conquesting strategically important new markets etc.

At *the second stage*, the selection of criteria of achieving the project objectives is made (an objective of the project may be, for example, reduction of risk of the existing activities, increasing the market share, growth rate, etc.).

The investment project can also pursue several objectives, in this case it is possible to use a system of criteria that would require prior determination which parameters affect the selected criteria in the system.

At the third stage the criteria of achieving the goals and parameters controlled are developed for each responsibility center taking into account capacities and powers of the managers of these centers.

At the fourth stage the decisions relating to organizational sides of investment controlling and above all organizational aspects of monitoring and control are made.

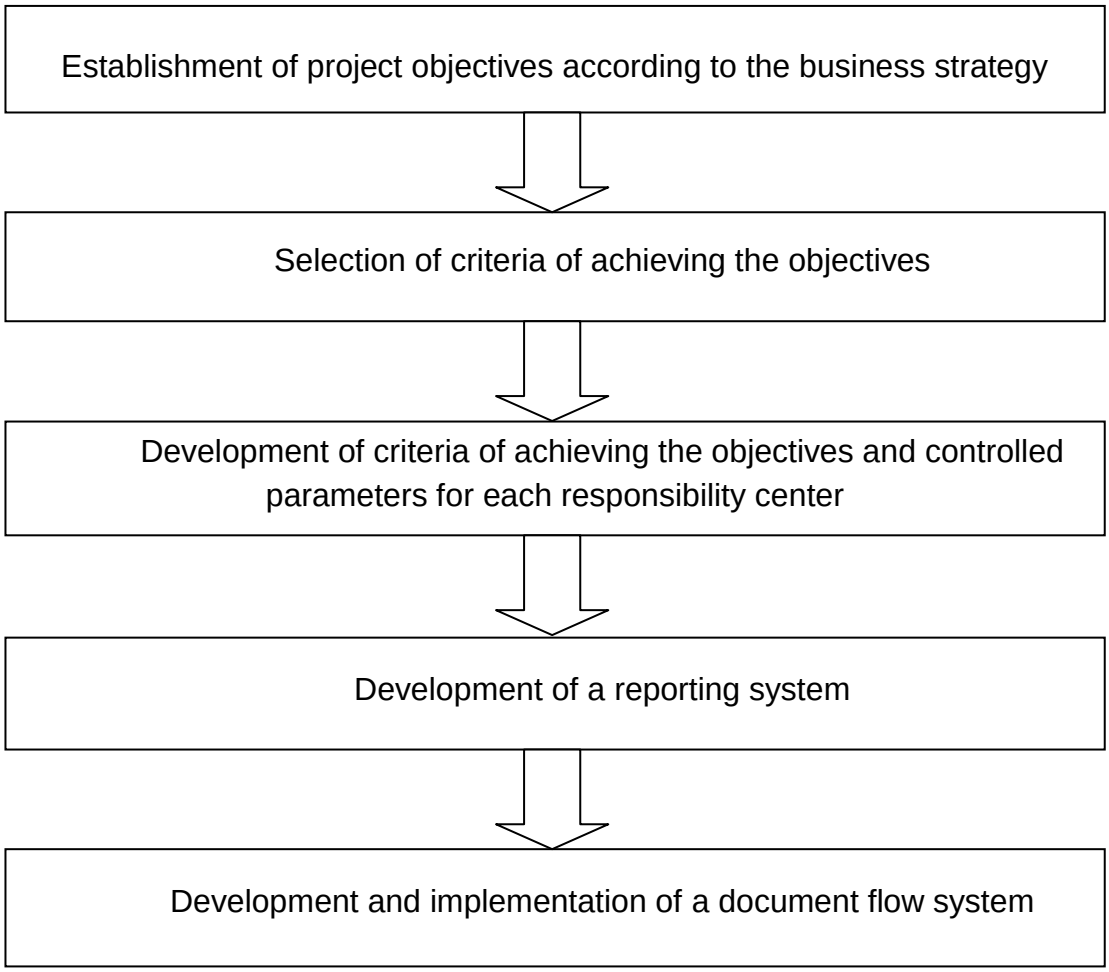

Fig. 5.1. **The process of creating a system of investment controlling**

At this stage the structure of the system of reporting of the investment project is developed. The system of reporting of the investment project must include planned and actual figures in terms of expenses, stages of work, deadlines, variations of actual values of controlled parameters from the planned ones, as well as the degree of their influence on the achievement of the project objectives.

The fifth stage, development and implementation of a document flow system. It is at this stage, that it becomes possible to implement together with further control the previous and the current control of deviations.

When implementing the investment project it is necessary to find out whether the goals have been achieved. For this purpose control of efficiency of the project implementation is made by conducting verification of the investment calculations. Calculations can be random or current. As a result, on the one hand, it is checking whether the goals of the project are achieved, on the other hand it is comparing the planned and actual values to develop corrective measures.

In investment controlling in order to assess the efficiency of investment projects a number of methods (procedures) of investment calculations are used: static methods; dynamic methods; scenarios and mathematical models [18; 27].

The methods of static investment calculations evaluate investment projects based on the expected result of their realization in one period. The most used static methods (procedures) are: cost comparison, performance comparison, machine hour accounting, profitability comparison, comparison of the static payback period.

The methods of dynamic investment calculations, unlike the static ones involve the calculations for the entire period of the investment project implementation taking into account the value of different time payments and receipts. The main dynamic calculation methods of the investment efficiency include: the net present method, the internal rate of return method, the annuity method, the end value method, comparison of the dynamic payback period (length of payback).

The general drawback of static and dynamic methods is the use of only monetary values. More opportunities are opened with mathematical models and scenarios. They allow researchers to consider a wider range of factors of the investment project scenarios and evaluate the impact of changes in the components on the overall result of the project implementation, for example, a sensitivity analysis.

5.2. The criteria for evaluating investment projects in controlling, their classification

The purpose of the general evaluation of the investment project is to present all the information about it in the form that allows the person who makes a decision to draw a conclusion about the appropriateness or inexpedience of

investments. The decisions on the acceptance, rejection or reorientation of the investment project are based on certain criteria. The selection of appropriate specific criteria for decision making about economic or financial attractiveness of the investment project depends on various factors, namely, the existence of restrictions on funding resources, the ability to obtain benefits (allowances) when purchasing resources, market prospects etc.

The significance of the results obtained during the financial and economic evaluation depends on the completeness and reliability of the initial data and accuracy of the methods used in the analysis.

The criteria for evaluating investment projects can be divided into formalized and nonformalized.

Nonformalized criteria include: the rating of the state based on the assessment of the investment climate; compliance of the objectives of the project with the overall enterprise development strategy; the level of infrastructure development that ensures project implementation (transport, communications, hotel service, etc.); presence of predictable market outlets (it is especially important for break-even analysis of the project), etc.

Formalized criteria for evaluating investment projects are:

traditional criteria: payback period; accounting rate of return (rate of return);

criteria with discounting cash flows: net present value; internal rate of return; annuity; profitability index; discounted payback period.

Assessment by using the formalized criteria is based on the forms of financial statements. Due to the structure of these reports it is possible to trace the dynamics of the investment project development during the whole period of its lifetime at each interval of planning. This kind of reporting (financial statements) makes it possible to calculate various indicators of financial condition, assess the liquidity, analyze the sources of the investment project financing. Thanks to the unified approach to presenting information it is possible to compare the results of calculations for various investment projects and possible solutions.

Let us consider some of the criteria for evaluating investment projects [45].

One of the simplest methods that are widely used in the world accounting and analytical practice is the method of determination of the payback period.

The payback period is the time in which the initial cash outflow of an investment is expected to be recovered from the cash inflows generated by the investment. In other words, the payback period is the time a project will take to pay back the money spent on it. It is based on the expected cash flows and provides a measure of liquidity.

The formula to calculate the payback period of a project depends on whether the cash flow per period of the project is even or uneven. In the case they are even, the formula for calculating the payback period is as follows:

$$\text{Payback period} = \text{initial investment} / \text{cash inflow per period}. \quad (5.1)$$

When cash inflows are uneven, it is need to calculate the cumulative net cash flow for each period and then the following formula for payback period is used:

$$\text{Payback period} = A + B/C, \quad (5.2)$$

where A is the last period with a negative cumulative cash flow;

B is the absolute value of the cumulative cash flow at the end of the period A;

C is the total cash flow during the period after A.

Any project should be only accepted if its payback period is less than the target payback period.

There is a list of advantages and disadvantages of the payback period.

The advantages of the payback period are:

it is very simple to calculate;

it can be a measure of risk inherent in a project. Since cash flows that occur later in a project's life are considered more uncertain, the payback period provides an indication of how certain the project cash inflows are;

for companies facing liquidity problems, it provides a good ranking of projects that would return money early.

The disadvantages of the payback period are:

it does not take into account the time value of money which is a serious drawback since it can lead to wrong decisions. (A variation of the payback method that attempts to remove this drawback is called the discounted payback period method);

it does not take into account the cash flows that occur after the payback period.

The accounting rate of return (ARR) (also known as a simple rate of return) is the ratio of the estimated accounting profit of a project to the average investment made in the project. This indicator is calculated with the use of the following formula:

$$\text{ARR} = \text{Average accounting profit} / \text{average investment}. \quad (5.3)$$

The average accounting profit is the arithmetic mean of accounting income expected to be earned during each year of the project's life time. Average investment may be calculated as the sum of the beginning and ending book value of the project divided by 2. Another variation of the ARR formula uses initial investment instead of average investment.

Any project should be only accepted if its ARR is equal to or greater than the required accounting rate of return.

The main advantages and disadvantages of this method are as follows.

Advantages:

like the payback period, this method of investment appraisal is easy to calculate;

it recognizes the profitability factor of investment.

Disadvantages:

it ignores the time value of money;

it can be calculated in different ways. Thus, there is a problem of consistency;

it uses accounting income rather than cash flow information. Thus, it is not suitable for projects which have high maintenance costs because their viability also depends upon timely cash inflows.

Thus, although traditional criteria have advantages, they also have significant disadvantages, that is why, in practice, besides these methods investment projects are often evaluated with the use of discounted cash flows.

Money received today is worth more than the same sum received in the future, i.e. it has a time value. This occurs for three reasons: the potential for earning interest/cost of finance; the impact of inflation; the effect of risk. Discounted cash flow (DCF) methods take account of this time value of money when evaluating investments.

The net present value (NPV) of a project is the potential change in an investor's wealth caused by that project while time value of money is being accounted for. It equals the present value of net cash inflows generated by a project less the initial investment in the project. It is one of the most reliable measures used in evaluating an investment project because it accounts for the time value of money by using discounted cash flows in the calculation.

Net present value calculations take the following two inputs: the projected net cash flows in successive periods of the project; the target rate of return i.e. the hurdle rate. The net cash flow equals the total cash inflow during a period, including the salvage value if any, less cash outflows from the project during the

period. The hurdle rate is the rate used to discount the net cash inflows. The weighted average cost of capital (WACC) is the most commonly used hurdle rate. The weighted average cost of capital is the average of the minimum after-tax required rate of return which a company must earn for all of its security holders (i.e. common stockholders, preferred stockholders and debtholders). It is calculated by finding out the cost of each component of a company's capital structure, multiplying it by the relevant proportion of the component to the total capital and then summing up the proportionate cost of components. The WACC is a very useful tool because it shows whether a particular project is increasing shareholders' wealth or just compensating the cost.

The first step involved in the calculation of the NPV is the estimation of the net cash flows from the project over its life. The second step is to discount those cash flows at the hurdle rate.

The net cash flows may be even (i.e. equal cash flows in different periods) or uneven (i.e. different cash flows in different periods). When they are even, the present value can be easily calculated by using the formula for the present value of annuity. However, if they are uneven, it is necessary to calculate the present value of each individual net cash inflow separately.

Once the total present value of all project cash flows is determined, the initial investment on the project from the total present value of inflows to arrive at the net present value must be subtracted. So the following formula is used:

when cash inflows are even:

$$\mathrm{NPV} = \mathrm{R} \times \frac{1-(1+\mathrm{i})^{-\mathrm{n}}}{\mathrm{I}} - \text{initial investment}, \qquad (5.4)$$

where *R* is the net cash inflow expected to be received in each period;

i is the required rate of return per period;

n is the number of periods during which the project is expected to operate and generate cash inflows;

when cash inflows are uneven:

$$\mathrm{NPV} = \frac{\mathrm{R}_1}{(1+\mathrm{i})^1} + \frac{\mathrm{R}_2}{(1+\mathrm{i})^2} + \frac{\mathrm{R}_3}{(1+\mathrm{i})^3} + \ldots - \text{initial investment}, \qquad (5.5)$$

where *i* is the target rate of return per period;

R_1 is the net cash inflow during the first period;

R_2 is the net cash inflow during the second period;

R_3 is the net cash inflow during the third period, and so on.

In the case of standalone projects, a project should be accepted only if its NPV is positive, be rejected if its NPV is negative and stay indifferent between accepting or rejecting if NPV is zero. In the case of mutually exclusive projects (i.e. competing projects), the project with higher NPV should be accepted.

The strengths and weaknesses of this method are:

the strength: the net present value accounts for the time value of money which makes it a sounder approach than other investment appraisal methods which do not discount future cash flows such as the payback period and the accounting rate of return;

the weaknesses: the NPV is after all an estimation. It is sensitive to changes in estimates for future cash flows, the salvage value and the cost of capital; the NPV does not take into account the size of the project.

The internal rate of return (IRR) is the discount rate at which the net present value of an investment becomes zero. In other words, IRR is the discount rate which equates the present value of the future cash flows of an investment with the initial investment.

A project should only be accepted if its IRR is not less than the target internal rate of return. When comparing two or more mutually exclusive projects, the project having the highest value of IRR should be accepted.

The calculation of the IRR is a bit more complex than other methods. As it is known that, with the IRR, the NPV is zero, thus:

NPV = 0; or

PV of future cash flows − initial investment = 0; or

$$\left[\frac{CF_1}{(1+r)^1}+\frac{CF_2}{(1+r)^2}+\frac{CF_3}{(1+r)^3}+\ldots\right]-\text{initial investment}=0, \qquad (5.6)$$

where r is the internal rate of return;

CF_1 is the period one net cash inflow;

CF_2 is the period two net cash inflow,

CF_3 is the period three net cash inflow, and so on ...

But the problem is, we cannot isolate the variable r (= the internal rate of return) on one side of the above equation. However, there are alternative procedures which can be followed to find the IRR. The simplest of them is:

1. Guess the value of *r* and calculate the NPV of the project at that value.
2. If the NPV is close to zero then the IRR is equal to *r*.
3. If the NPV is greater than 0 then *r* increases and step 5 follows.
4. If the NPV is smaller than 0 then *r* decreases and step 5 follows.
5. Recalculate the NPV using the new value of *r* and go back to step 2.

In the world practice, implementation of investment projects is quite often not a single payment but a sequence of cash receipts and disbursements over a period of time. Recently in the western practice for justification of a project the *method of annuity* is used. An annuity is a series of evenly spaced equal payments made for a certain period of time. There are two basic types of annuity known as ordinary annuity and annuity due. Ordinary annuity is one in which periodic payments are made at the end of each period. Annuity due is the one in which periodic payments are made at the beginning of each period.

The present value of an annuity is the sum of the periodic payments each discounted at the given rate of interest to reflect the time value of money. Alternatively defined, the present value of an annuity is the amount which if invested at the start of the first period at the given rate of interest will equate the sum of the amount invested and the compound interest earned on the investment with the product of number of the periodic payments and the face value of each payment.

Although the present value (PV) of an annuity can be calculated by discounting each periodic payment separately to the starting point and then adding up all the discounted figures, however, it is more convenient to use the "one step" formulas:

$$\text{The PV of an ordinary annuity } = R \times \frac{1-(1+i)^{-n}}{i}, \tag{5.7}$$

$$\text{PV of an annuity due} = R \times \frac{1-(1+i)^{-n}}{i} \times (1+i), \tag{5.8}$$

where *i* is the interest rate per compounding period;

n is the number of compounding periods;

R is the fixed periodic payment.

The profitability index is an investment appraisal method calculated by dividing the present value of future cash flows of a project by the initial investment required for the project.

The profitability index is calculated by the formula:

$$\text{Profitability index} = \frac{\text{present value of future cash flows}}{\text{initial investment required}} = \\ = 1 + \frac{\text{net present value}}{\text{initial investment required}}. \quad (5.9)$$

The profitability index is actually a modification of the net present value method. While present value is an absolute measure (i.e. it gives the total hryvnia figure for a project), the profitability index is a relative measure (i.e. it gives the figure as a ratio).

A project should be accepted if the profitability index is greater than 1, stay indifferent if the profitability index is zero and should not be accepted if the profitability index is below 1.

The profitability index is sometimes called the benefit-cost ratio. It helps in ranking projects based on their per hryvnia return.

In controlling for evaluating investment projects the discounted payback period is used.

As has already been noted, one of the major disadvantages of the simple payback period is that it ignores the time value of money. To counter this limitation, an alternative procedure called *the discounted payback period* may be followed, which accounts for the time value of money by discounting the cash inflows of the project.

In the discounted payback period it is necessary to calculate the present value of each cash inflow taking the start of the first period as a zero point. For this purpose the management has to set a suitable discount rate. The discounted cash inflow for each period is to be calculated using the formula:

$$\text{Discounted cash inflow} = \frac{\text{actual cash inflow}}{(1+i)^n}, \quad (5.10)$$

where *i* is the discount rate;

n is the period to which the cash inflow relates.

The above formula is usually split into two components which are the actual cash inflow and the present value factor (i.e. 1 / (1 + i)^n). Thus the discounted cash flow is the product of the actual cash flow and the present value factor.

The rest of the procedure is similar to the calculation of the simple payback period except that we have to use the discounted cash flows as calculated above instead of the actual cash flows. The cumulative cash flow will be replaced by the cumulative discounted cash flow.

$$\text{Discounted payback period} = A + B / C, \quad (5.11)$$

where *A* is the last period with a negative discounted cumulative cash flow;

B is the absolute value of the discounted cumulative cash flow at the end of the period *A*;

C is the discounted cash flow during the period after *A*.

It should be noted, that in the calculation of the simple payback period, an alternative formula for situations where all the cash inflows were even could be used. That formula won't be applicable here since it is extremely unlikely that the discounted cash inflows will be even.

If the discounted payback period is less than the target period, the project should be accepted. Otherwise it should be rejected.

Thus, the formation of the system of investment controlling at the enterprise depends on the mechanisms of the controlling system as a whole. A large number of methods for assessing investment projects in controlling makes it possible to select the ones that are best suited to the enterprise in the present.

Questions for self-study

1. The criteria for evaluation of investment projects, their advantages and disadvantages.
2. What criteria are used in controlling of investment projects under conditions of uncertainty?
3. The approaches to the formation of an investment portfolio of an enterprise based on the controlling research.

Questions for self-assessment

1. What are the features of investment projects controlling?
2. What are the main objectives of investment controlling?
3. What are the stages of the process of creating the system of investments controlling?

4. What criteria are used in controlling of investment projects, what are their features?

5. What are the differences between traditional criteria and criteria with discounting cash flows?

6. Decision-making methods in controlling

6.1. Decision making and relevance of information. The main decision-making approaches

One of the main functions of controlling is information support for making rational management decisions to ensure the efficient and competitive functioning of an enterprise. Management decisions are the result of a specific management activity, the basis of management.

The object of management decision, as a rule, is the problems associated with solving theoretical and practical issues. Management decisions are the result of analysis, forecasting, optimization, economic justification and selection of alternatives for achieving specific goals.

Decision making involves a choice of several options that best allows for obtaining desired results. So, decision making is a conscious process of making a choice among several alternatives to find that which helps achieve the goal or solve a problem.

Management decisions must meet the following requirements: a comprehensive justification of decisions, compliance of the decision with the legislation, consistency (new decisions should not contradict the existing ones and duplicate them); timeliness (decision making at a time when it can and should be implemented); resources endowment; clarity and brevity (inadmissibility of double interpretation of the decision).

Management decisions are characterized by great diversity, thus the controlling system, focusing on a certain type of required information, has a creative and exploratory character.

The decision-making process includes:

setting a goal (problem);

studying the problem based on the information received;

selection and justification of criteria of efficiency (effectiveness) and possible consequences of the decision;

discussion of various options for a solution;

selection and formulation of an optimal decision;

acceptance of a decision;

concretization of the decision for persons who will implement it.

The following factors should be taken into account in the process of developing management decisions:

characteristics of the problem (its complexity, degree of novelty, type);

the degree of development of a problem (availability of methods, programs, skills for its implementation);

characteristics of information (volume, availability, reliability, relevance, etc.);

limited resources;

organization of development of solutions;

competence, education and experience of managers;

subjective factors (compatibility of staff, their unity);

information technologies.

The problem of selecting a decision by a manager is one of the most important ones in modern management. It requires a comprehensive evaluation by the manager of the particular circumstances and independent adoption of one or more options of possible decisions.

Due to the complexity and diversity of the decision-making process, there are many approaches to it. Some of the most known approaches to decision making are [17]: the rational approach (which includes several theories explaining management decision making: designing a strategy (SWOT analysis), planning a strategy (by Ansoff), positioning (by Porter)); the bounded-rationality approach by H. Simon (based on the fact that there is no absolute rationality); the approach based on the principle of efficient management by Peters and Waterman which is based on the fact that excessive rationality suppresses the innovations, does not account for noneconomic goals of the company; the sociological and psychological approaches which examine the impact of a human and human relations on the decision making process. Synthesis of all the above approaches is the theory of configurations and the "incrementalism" approach whereby decision making is a long process, carried out by the head gradually, during which he consults with employees to get support and gather the necessary information.

Depending on the approach used, the role of controlling changes in specific circumstances.

The role of controlling in the rational approach is to provide the most complete and accurate quantitative information, calculate indicators, find the optimum.

With the bounded-rationality approach the main task of controlling is the rationalization of the management decision-making process through the use of the methods of decision making under uncertainty. The main difference of this approach from the previous (classic rational) one is that controlling is not so much focused on optimization, it rather establishes limitations that characterize the acceptable options.

Within the efficient management approach emphasis is placed on the coordinating, integrating role of controlling. There controlling mainly uses models of decision making under uncertainty; the role of monitoring and preliminary control is increased, while the task of optimization as such is not put in front of controlling.

The features of the sociological approach define the main principles of construction and functioning of the controlling system at an enterprise as an economic and analytical, coordinating, management information system.

The psychological aspect of decision making is important for the development of the structure of controlling reporting, for the correct choice of relevant information, for management decision making, and for development of methods of analysis of this information.

Within the "incrementalism" approach at different stages of the management decision making controlling accumulates baseline information, analyzes it, develops criteria for decision making taking into account the specifics of the circumstances, informs employees of the enterprise about the decision which is being prepared, and coordinates the activities of various departments responsible for the implementation of this decision.

Configurations theory considers the management decision-making process at a new qualitative level, offering a logic of selecting the theory, which is able to adequately describe decision making in a particular situation. Since the theory of configurations is a synthesis of all the above approaches, integrating them into a coherent whole, it is advisable to focus on the theory of configurations when developing decision-making criteria in the controlling system.

The problem of decision making has a fundamental character since it involves a complex relationship of different aspects: information, economic, psychological, logical, organizational, legal, mathematical, technical and others. Therefore, the decision-making processes due to the differences of enterprises and organizations, situations and problems that need solving are determined by specific conditions.

Selection of the criteria for decision making depends on the model of decision-making in a particular situation. During decision making a manager uses quantitative and qualitative criteria which determine the individual peculiarities of specific situations. Quantitative criteria are more versatile and serve as evaluation. Quantitative criteria can be: maximizing profits, loss of opportunity, contribution margin etc. Qualitative criteria can be: creating the image of the company, getting market leadership and others.

During decision making in controlling a manager first of all has to pay attention to the relevant information (costs and revenues), that is changed depending on the options of decision. Relevant costs and revenues are those costs and revenues that change as a direct result of a decision taken.

The features of relevant costs and revenues are:

they are future costs and revenues (sunk costs are always irrelevant);

they are incremental (relevant costs are incremental costs and it is the increase in costs and revenues that occurs as a direct result of a decision taken that is relevant. Common costs can be ignored for the purposes of decision making);

they are cash flows – future costs and revenues must be cash flows arising as a direct consequence of the decision taken.

The opportunity cost is also an important concept in decision making. It represents the best alternative that is foregone in taking the decision. The opportunity cost emphasises that decision making is concerned with alternatives and that a cost of taking one decision is the profit or contribution forgone by not taking the next best alternative.

Determination of the relevant costs (revenues) is related to considering two groups of factors: quantitative and qualitative. Quantitative factors are reflected in numerical terms (the costs' of raw materials, the cost of energy consumption for technological purposes), qualitative factors are difficult to measure. Sometimes it will be better to take a decision related to the increase of costs than lose the permanent supplier. It is important that qualitative factors be taken into account when making decisions, otherwise there is a risk of taking wrong decisions. Determination of the relevance of costs depends on specific situations. It means that in one case the costs are relevant, in another case the same costs can be not relevant (irrelevant). Therefore, it is impossible to determine the list of relevant costs. In each situation one must remember that the relevant costs are future costs, which vary depending on a decision.

6.2. Making decisions based on the cost-volume-profit analysis (CVP)

In order to know the consequences of decisions, it is necessary to investigate the relationship of costs, the volumes of activity and profit, which allows the company to find the volume of sales which will provide reimbursement of all costs and obtain the necessary profit, to determine the impact of changes in costs, volume and sales prices on profits, the optimal structure of costs. It is possible if a company uses the analysis which is based on the relationship "cost-volume-profit" (CVP analysis).

The CVP analysis is the systematic examination of the relationship between selling prices, sales, production volumes, costs, expenses and profits. This analysis provides very useful information for decision making in the management of a company. For example, the analysis can be used in establishing sales prices, in the product mix selection to sell, in the decision to choose marketing strategies etc. In the current environment of business, managers must act and take decisions in a fast and accurate manner. As a result, the importance of the cost-volume-profit analysis is still increasing as time passes.

The relationship "cost-volume-profit" forms the basic model of financial activity, which allows its use for short-term planning and evaluating alternatives. This analysis is based on a number of fixed relationships. If price, cost and other conditions change, the CVP model will be different.

The relationship CVP can be described analytically and graphically.

Analytical relationship is described by the following equations (in general form):

$$\text{Sales} = \text{variable costs} + \text{fixed costs} + \text{profit}; \quad (6.1)$$

$$\text{Sales} = \text{variable costs} + \text{contribution margin}. \quad (6.2)$$

The contribution margin is a relationship between the cost, volume and profit. It is the revenue excess from sales over variable costs. The concept of the contribution margin is particularly useful in the planning of business because it gives an insight into the potential profits that can generate a business.

An important part of the CVP analysis is the point where total revenues equal total costs (both fixed and variable costs). This point is called the breakeven point (BEP). At this breakeven point, a company will experience no income or loss. This BEP can be an initial examination that precedes a more detailed CVP analysis. The BEP is useful in planning for the company, especially when there is an expansion or reduction of operations.

To calculate the break-even point the following formulas is used:

$$\text{Break-even point (in units)} = \\ = \text{fixed costs / contribution margin per unit;} \quad (6.3)$$

$$\text{Contribution margin per unit} = \\ = \text{selling price per unit - variable costs per unit;} \quad (6.4)$$

$$\text{Break-even point (in units)} = \\ = \text{break-even point (in sales revenue) / selling price per unit;} \quad (6.5)$$

$$\text{Break-even point (in sales revenue)} = \\ = \text{fixed costs / contribution margin ratio;} \quad (6.6)$$

$$\text{Break-even point (in sales revenue)} = \\ = \text{break-even point (in units) x selling price per unit.} \quad (6.7)$$

The contribution margin ratio (which is sometimes called the profit-volume ratio) indicates the percentage of each sales hryvnia available to cover fixed costs and to provide profit. The contribution margin ratio is calculated by the formulas:

$$\text{Contribution margin ratio} = \text{contribution margin / sales;} \quad (6.8)$$

$$\text{Contribution margin ratio per unit} = \\ = \text{contribution margin per unit / selling price per unit.} \quad (6.9)$$

In the break-even point, sales and costs are exactly the same. Still, the break-even point is not the goal in most of the companies. In contrast, managers of a company seek to maximize profits. Modifying the break-even equation, the volume of sales required to earn an amount of desired or expected profit can be estimated. For this purpose, a target profit factor is added to the break-even equation as follows:

$$\text{Sales to attain target profit (in units)} = \frac{(\text{fixed costs} + \text{target profit})}{\text{contribution margin per unit}}, \quad (6.10)$$

$$\text{Sales to attain target profit (in units)} = \frac{(\text{fixed costs} + \text{target profit})}{\text{contribution margin ratio}}. \quad (6.11)$$

Net profit (after-tax profit), which is needed for companies, can be determined by the formula:

$$\text{After-tax profit} = \text{pretax profit} - \text{taxes} = \\ = \text{pretax profit} \times (1 - \text{tax rate}), \tag{6.12}$$

or

$$\text{After-tax profit} = (\text{sales} - \text{variable costs} - \text{fixed costs}) \times \\ \times (1 - \text{tax rate}). \tag{6.13}$$

The method of calculating the break-even point, which is presented above, can be used by a single product company. But companies usually produce and sell more than one type of product.

The proportion in which a multi-product company sells its products is referred to as a sales mix. Companies involved in selling two or more products try to sell their products in a proportion or mix that maximizes their total profit.

Usually, different products have different sales prices, variable costs and contribution margin.

To determine the break-even point of each type of products the value of the weighted-average contribution margin must be calculated.

The order of calculating the break-even point for each type of products is as follows:

1. Calculation of the weighted-average contribution margin. To calculate the weighted-average contribution margin per unit (WACM) it is necessary to summarise the multiplications of each product's unit contribution margin by its proportion (share) of total sales.

2. Calculation of the total number of units of all the products (total BEP) that must be sold to break-even. For this purpose the total fixed costs must be divided by the WACM.

3. Calculation of the break-even of units by product. The total BEP is multiplied by the proportion (share) of total sales (for each type of products).

It is assumed that all the fixed costs are indirect relative to specific types of products.

The relationship CVP can be presented graphically by:

the basic break-even chart (Fig. 6.1);

the contribution break-even chart (Fig. 6.2);

the profit-volume chart (PV chart) (Fig. 6.3).

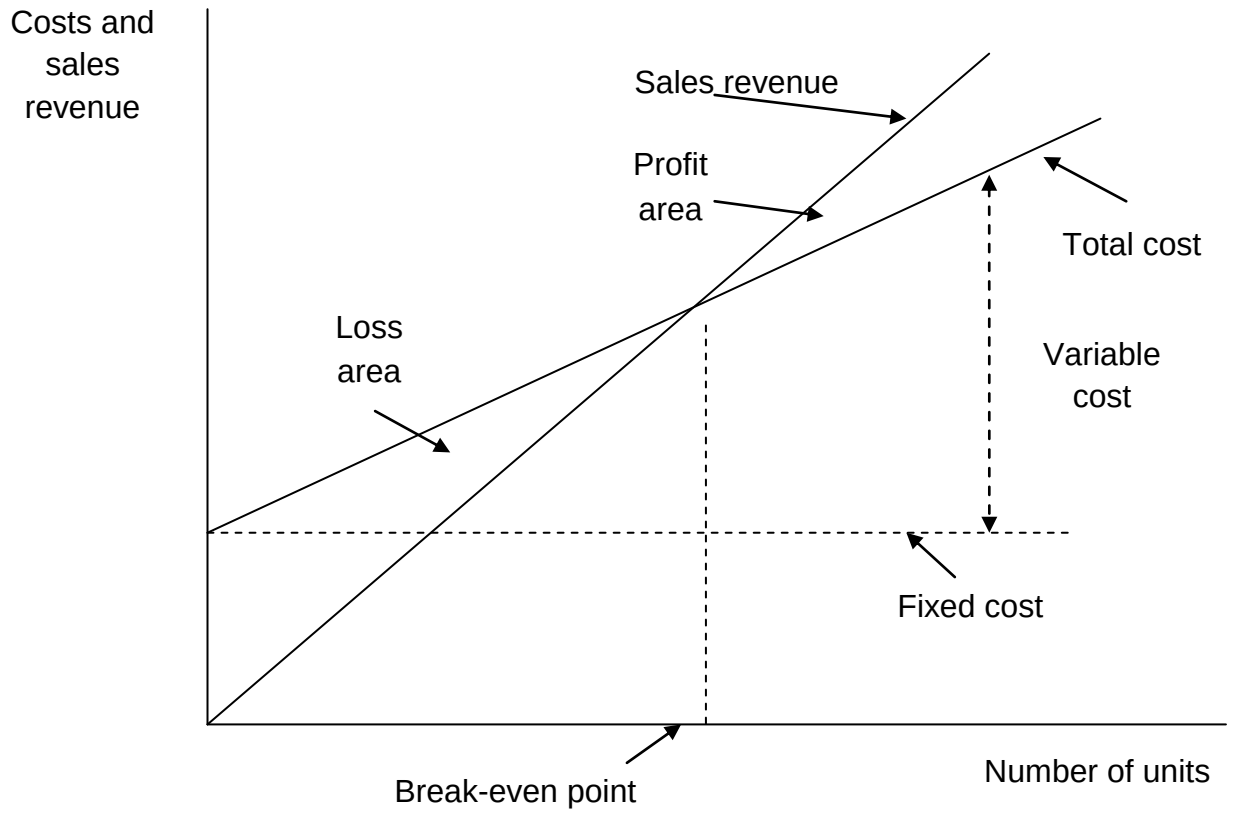

Fig. 6.1. **The basic break-even chart**

The *basic break-even chart* records costs and revenues on the vertical axis (y) and the level of activity on the horizontal axis (x). Lines are drawn on the chart to represent costs and sales revenue. The break-even point can be read off where the sales revenue line cuts the total cost line (Fig. 6.1).

When building a break-even chart it is assumed that the variable costs and the selling price do not change and therefore the dependence of the total cost and revenues has a linear character. There is only one break-even point on the chart.

The break-even chart gives satisfactory relationship between volume, cost and profit within the acceptable range of production volumes – the relevant range. The relevant range is the volume of activity over which cost behavior stays valid. For example, fixed costs remain constant only within a certain range of the activity volume (i.e., the relevant range); if this activity volume is overcome, fixed costs may change. Fixed costs usually vary (increase) stepwise (step costs). In this case, there may be a few break-even points on the chart and profit and loss areas interchange with increasing volumes of activity.

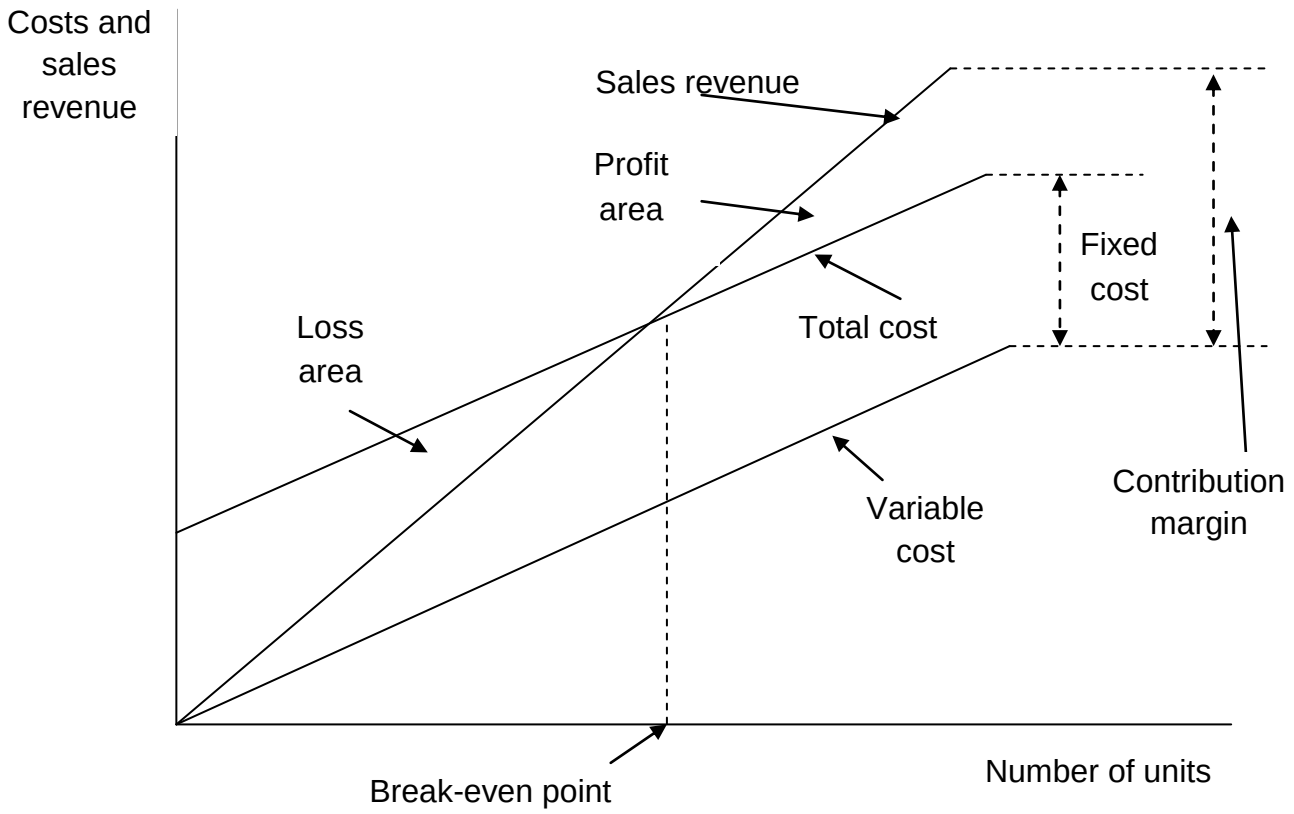

Fig. 6.2. **The contribution break-even chart**

One of the problems with the conventional or basic break-even chart is that it is not possible to read contribution directly from the chart. A contribution break-even chart is based on the same principles, but it shows the variable cost line instead of the fixed cost line. The same lines for total cost and sales revenue are shown, so the break-even point and profit can be read off in the same way as with a conventional chart. However, it is also possible to read the contribution for any level of activity (Fig. 6.2).

Another form of break-even chart is the *profit-volume chart* (Fig. 6.3). This chart plots a single line depicting the profit or loss at each level of activity. The break-even point is where this line cuts the horizontal axis. The vertical axis shows profits and losses and the horizontal axis is drawn at the zero profit or loss.

The profit-volume chart is also called a profit chart or a contribution-volume chart. The main advantage of the profit-volume chart is that it is capable of depicting clearly the effect on profit and break-even point of any changes in the variables.

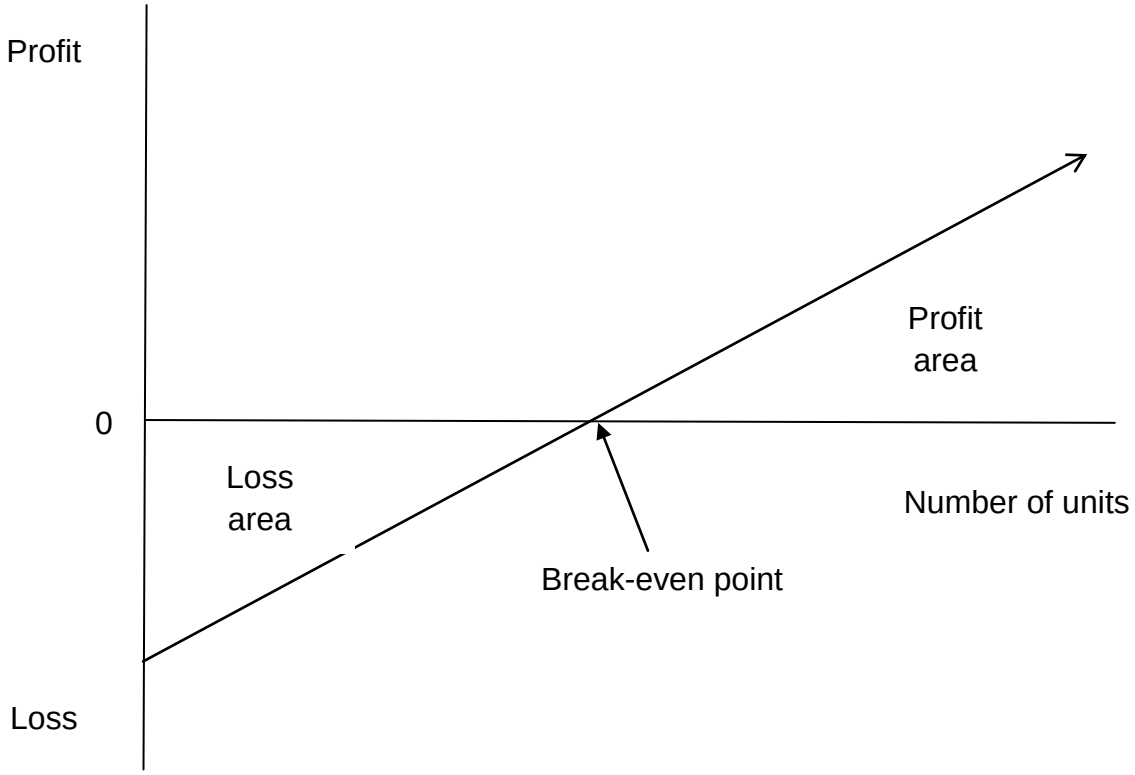

Fig. 6.3. **The profit-volume chart**

The PV chart shows the relationship between a company's earnings (or losses) and its sales. The chart shows how different levels of sales affect a company's profits. Companies can use profit-volume charts to establish sales goals, to analyze whether a potential project is likely to be profitable and to see the maximum potential profit or loss of a given project, as well as where the break-even point lies.

Analysis of the relationship CVP can provide accurate data if some assumptions are performed. If they are not taken into account this would lead to serious mistakes and wrong conclusions in the analysis. The analysis of break-even should consider that:

1. All variables remain constant except volume.

This assumption suggests that volume is the only factor that can cause cost and profits to change.

Such factors as increasing production efficiency, changing sales mix and price levels are not considered.

2. Only one product is being produced or there is a constant sales mix.

Following on from the previous assumption, CVP analysis only applies to where one product is being examined or if there are a number of products – then they are always sold in the same proportions or combination.

3. Total costs and total revenue are linear functions.

This assumption suggests that the variable cost per unit and the selling price per unit do not change, i.e. they are not affected by discounts.

4. Profits are calculated using variable (marginal) costing.

Variable costing facilitates profit analysis as it separates variable and fixed costs and treats fixed costs as a period expense rather than attempts to allocate them to products.

5. Costs can be accurately divided into their fixed and variable elements.

This is a key requirement of variable costing.

6. The analysis only applies to the relevant range.

CVP analysis does not apply outside the boundaries of this sales volume range.

7. The analysis only applies to a short-term horizon.

The presented assumptions restrict the use of CVP analysis, but the analysis provides for obtaining appropriate information for making management decisions.

6.3. Profit sensitivity analysis

Sensitivity analysis shows how the CVP model will change with changes in any of its variables (e.g., changes in fixed costs, variable costs, sales price, or sales mix). The focus is typically on how changes in variables will alter profit.

In conducting CVP analysis attention is mostly paid to the following major ways to increase the profitability of the business:

the increase in sales;

the increase in prices of products sold;

the reduction of variable costs;

the reduction of fixed costs;

improving the sales structure (sales mix).

Sales can be increased by: the increase in advertising costs (fixed costs increase); the increase in the number of sellers (fixed costs increase); reduction of the selling price. On the break-even chart, with the increase in the sales volume the break-even point is at the same level, but the profitability (profit) area increases. But it must be predicted whether an enterprise has enough production capacity, whether the market outlets can increase sales, how it will affect the cash flows.

The increase in prices of products sold reduces the loss area and increases the profit area. But the policy of price increase could negatively affect

the demand. Also it is necessary to analyze how the new price is correlated with the prices of competitors.

With the reduction of variable costs the loss area is reduced, the profit area is increased. Reduction of variable costs is achieved in many different ways: using cheaper materials or their substitutes; more efficient use of labor resources; obtaining wholesale discounts on procured resources; acceleration of the payment period of materials and receiving discounts for quick payment, organizational and technical measures and others.

Reduction of fixed costs leads to reduction of the loss area and increase of the profitability zone (profit area). Ways to reduce fixed costs for the enterprise are: moving to cheaper or less in size premises; reducing the number of employees with fixed salary; reducing advertising, training and other costs; reducing business travel expenses; a decrease in interest expenses; a decrease in investment in inventories and receivables or extension of the terms of payment of accounts payable.

Improving the sales mix through sales of products with a higher contribution margin allows the enterprise to reduce the loss area and increase the profit area.

To determine the impact of changes in sales on profit the margin of safety is used.

The margin of safety is the excess of budgeted or actual sales over the break-even volume of sales. It states the amount by which sales can drop before losses begin to be incurred. The higher the margin of safety, the lower the risk of not breaking even.

The formula or equation for the calculation of the margin of safety is as follows:

$$\text{Margin of safety} = \frac{\text{total budgeted or actual sales}}{\text{break-even sales}}. \qquad (6.14)$$

The margin of safety can also be expressed in the percentage form:

$$\text{Margin of safety percentage or margin of safety ratio} = \\ = \frac{\text{margin of safety}}{\text{total budgeted or actual sales}}. \qquad (6.15)$$

The margin of safety is a tool to help management understand how far sales could change before the enterprise would have a net loss.

Information about the margin of safety is particularly useful in situations where large portions of an enterprise's sales are at risk, such as when they

are tied up in a single customer contract that can be cancelled. Knowing the margin of safety gives a good idea of the probability when an enterprise may find itself in difficult financial circumstances caused by sales fluctuations.

The character of change in the enterprise profit depends on its cost structure. The cost structure is the ratio of fixed and variable costs. A greater proportion of fixed costs in the structure provides a greater impact on profits when changing the volume of sales.

The extent to which fixed costs are used in the cost structure of the enterprise is called *operating leverage*. Operating leverage is a cost structure that provides a higher percentage growth of profit than the corresponding percentage of the volume of sales.

The degree of operating leverage (DOL) is a measure, at a given level of sales, of how a percentage change in the sales volume will affect profits.

The degree of operating leverage at a given level of sales is calculated by the following formula:

$$\text{Degree of operating leverage} = \frac{\text{contribution margin}}{\text{net operating income}}. \qquad (6.16)$$

Essentially, operating leverage boils down to an analysis of fixed costs and variable costs. Operating leverage is highest in companies that have a high proportion of fixed operating costs in relation to variable operating costs. This kind of company uses more fixed assets in the operation of the company. Conversely, operating leverage is lowest in companies that have a low proportion of fixed operating costs in relation to variable operating costs.

The benefits of high operating leverage can be immense. Companies with high operating leverage can make more money from each additional sale if they don't have to increase costs to produce more sales.

6.4. Pricing decisions

The pricing policy of the enterprise also exerts great influence on the change of profit that requires important decision making. The aim of the policy is to determine the selling price that will achieve the sales volume which maximizes profits. Changing of profit first of all depends on the price, sales volume, cost, product range. Basically pricing policy is conditioned by demand, by the actions of competitors and by costs. Clearly, the pricing decision can be critical. If the price is too high, customers will avoid purchasing the enterprise's

products. If the price is set too low, the enterprise's costs may not be covered. Moreover, in determining the pricing policy other factors are also taken into account, such as: marketing, after-sales service, delivery times, reliability of suppliers, credit conditions.

Pricing strategy must be corrected taking into account the stage of the product life cycle. When choosing a pricing strategy it is also necessary to take into account the following factors: the level of fixed costs; the level of the contribution margin for small orders; the costs of procurement at high variable costs; the share of the most profitable products; the system of discounts for goods; the policy of increasing prices; product features.

The selection of a pricing method is of great importance for obtaining a maximum profit. In most cases, the price of products and services is determined based on cost, because it provides the ability to set the initial price. In addition, the cost of products and services is the limit below which price cannot be accepted in the long term.

The usual approach to pricing is to mark up cost. A product's markup is the difference between its selling price and its cost. The markup is usually expressed as a percentage of cost. This approach is called *cost plus pricing* because the predetermined markup percentage is applied to the cost base to determine a target selling price:

$$\text{Selling price} = \text{cost} + (\text{markup} \times \text{cost}). \quad (6.17)$$

Two key issues must be addressed when the cost plus approach to pricing is used: what cost should be used and how the markup should be determined. Let us consider several alternative approaches to pricing [38]:

1. *Price elasticity of demand* – the *economists' approach to pricing*. If an enterprise raises the price of a product, unit sales ordinarily fall. The sensitivity of unit sales to changes in prices is called the price elasticity of demand. A product's price elasticity should be a key element in setting its price. The price elasticity of demand measures the degree to which the unit sales of a product or service are affected by a change in price. Demand for a product is said to be inelastic if a change in price has little effect on the number of units sold. On the other hand, demand for a product is said to be elastic if a change in price has a substantial effect on the volume of units sold.

Price elasticity is very important in determining prices. Managers should set higher markups over cost where customers are relatively insensitive to price

(i.e., demand is inelastic) and lower markups where customers are relatively sensitive to price (i.e., demand is elastic).

The price elasticity of demand will be used to calculate selling price that maximizes the company profits.

The optimal selling price should depend on two factors – the variable cost per unit and how sensitive unit sales are to changes in price.

Despite the apparent optimality of prices based on marking up variable costs according to the price elasticity of demand, surveys consistently reveal that most managers approach the pricing problem from a completely different perspective. They prefer to mark up some version of full, not variable, costs, and the markup is based on desired profits rather than on factors related to demand.

2. *The absorption costing approach to pricing.* The absorption costing approach to cost plus pricing differs from the previous one both in what costs are marked up and how markup is determined. Under the absorption costing approach to cost plus pricing, the cost base is the absorption costing unit product cost rather than variable costing.

The first step in the approach is to compute the unit product cost. Selling, administrative costs are not included in the cost base. Instead, the markup is supposed to cover these expenses. The markup must be large enough to cover selling, administrative expenses and provide an adequate return on investment.

But there are some disadvantages of using this approach. The absorption costing approach relies on a forecast of unit sales. Neither the markup nor the unit product cost can be computed without such a forecast. The absorption costing approach essentially assumes that consumers need the forecasted sales and will pay whatever price the company decides to charge. However, customers have a choice. If the price is too high, they can buy from a competitor or they may choose not to buy at all.

Some managers believe that the absorption costing approach to pricing is safe. But it is not so. This approach is only safe as long as customers choose to buy at least as many units as managers forecasted they buy.

Rather than focusing on costs (which can be dangerous if forecasted unit volume does not materialize) many managers focus on customer value when making pricing decisions.

3. *The target costing approach* to pricing. Target costing is the process of determining the maximum allowable cost for a new product and then developing

a prototype that can be profitably made for that maximum target cost figure. A number of companies (primarily in Japan) use target costing, including Compaq, Cummins Engine, Daihatsu Motors, DaimlerChrysler, Ford, Isuzu Motors, ITT, NEC, and Toyota etc. The target costing for a product is calculated by starting with the product's anticipated selling price and then deducting the desired profit. The product development team is then given the responsibility of designing the product so that it can be made for no more than the target cost.

The approach was developed in recognition of two important characteristics of markets and costs. The anticipated market price is taken as a given in target costing. The difference between target costing and other approaches to product development is profound. Instead of designing the product and then finding out how much it costs, the target cost is set first and then the product is designed so that the target cost is attained.

Target costing has the following main advantages or benefits: proactive approach to cost management; orientation of organizations towards customers; breaking down barriers between departments; enhanced employee awareness and empowerment; fostering partnerships with suppliers; reduced time to market.

The main disadvantages or limitations of this approach are: effective implementation and use requires the development of detailed cost data; the quality of products may deteriorate due to the use of cheap components which may be of inferior quality.

4. *Time and material pricing in service companies*. Some companies (particularly in service industries) use a variation of cost plus pricing called time and material pricing. Under this method, two pricing rates are established – one, based on direct labor time, and another, based on the cost of direct materials used. This pricing method is used in repair shops, in printing shops, and by many professionals such as physicians and dentists. The time and material rates are usually market-determined. In other words, the rates are determined by the interplay of supply and demand and by competitive conditions in the industry. However, some companies set the rates using a process similar to the process followed in the absorption costing approach to cost plus pricing. In this case, the rates include allowances for selling, administrative expenses; other direct and indirect costs; and a desired profit.

This method of setting prices is a variation of the absorption costing approach. Thus, it is not surprising that it suffers the same problem. Customers may not be willing to pay the rates that have been computed.

Questions for self-study

1. Classification of management decisions, the main methods of making decisions.
2. The basic decision-making paradigms.
3. Pricing strategies, their characteristics.

Questions for self-assessment

1. What is the essence of the decision-making process?
2. What are the stages of the decision-making process?
3. What is the role of controlling in managerial decision making?
4. What approaches to decision making are used?
5. What criteria are used in decision making?
6. What is the essence of decision making based on relevant information?
7. What is the essence of the cost-volume-profit analysis (CVP)?
8. Explain the analytical model of CVP.
9. What are the types of graphical models of CVP?
10. What does the breakeven analysis include?
11. How is the break-even point for multiple products determined?
12. What are the assumptions underlying CVP analysis?
13. How does the cost structure affect change in the operating profit?
14. Identify the ways to reduce fixed costs at an enterprise.
15. What is the margin of safety? How is it calculated?
16. What are the approaches to pricing? What are their features?

7. The organizational and methodical basis for the creation of an enterprise controlling system

7.1. The basic requirements for creating a controlling service at an enterprise

Implementation of the system of controlling is of paramount importance for enterprises where management activity is at very low levels and does not meet modern requirements of the market.

There are reasons that indicate the necessity for implementation of the system of controlling at an enterprise:

deterioration of financial indicators of an enterprise;

bad financial indicators of activity of an enterprise in comparison with similar indicators of competitors;

changing targets of an enterprise and lack of coordination between different objectives;

use of obsolete methods for enterprise planning, accounting, costing and analysis that do not comply with the requirements of modern enterprise management;

lack of accounting and analysis techniques that can be the basis for operative monitoring of the activities of an enterprise and timely adoption of appropriate management decisions;

duplication or absence of some functions in the organization of the enterprise activity, conflicts in their implementation.

The presence of several or at least one of these problems is the basis for a decision on the need to introduce a system of controlling in the enterprise activity.

Effective implementation of all tasks of controlling requires paying close attention to the organization of controlling work at an enterprise. This implies the feasibility of establishing the controlling service at an enterprise – a special organization unit, designed for optimization of the flows of information moving between divisions and from the subordinates to managers.

The controlling service created at the enterprise is a part of its financial and economic services, along with other departments, such as accounting, finance, planning and economic departments.

Since one of the main objects of controlling is costs, an important thing for the analysis and management of costs and benefits is the possibility of providing controlling services on time and in full to obtain relevant information for further development of recommendations on taking appropriate management decisions by managers. Thus, when creating a controlling service at an enterprise, managers should take into account certain requirements, such as:

a possibility of obtaining the necessary information in full and on time by the controlling service staff from the following divisions of the enterprise: accounting, finance, planning and economic departments, logistics and marketing, and other departments and services of the enterprise;

a possibility of and authorities for controlling service workers to organize the work on obtaining additional information unavailable in the documents of

some departments, but needed for the procedure of controlling a particular aspect of the problem;

a possibility of introducing new procedures for collection of analytical information on a regular basis by employees of the controlling service;

a possibility of rapid communication between the controlling service employees and top management for getting the information needed for effective decision making;

the controlling service independence from any economic and financial service of an enterprise.

The list of these requirements to the creation of a controlling service at the enterprise defines the opportunity for its employees to perform all the functions assigned to the controlling system of the enterprise.

7.2. The stages of implementation of controlling at an enterprise

Creating a controlling system at an enterprise is quite a long process which is influenced by many factors, including the degree of awareness of the need of controlling by managers, availability of resources for the implementation of such measures, features of the business operation and so on. In general, introduction of controlling in the enterprise activity implies five basic stages (Fig. 7.1) [12; 15].

Let us consider each of these successive stages.

At the beginning of the implementation of controlling, at the first stage, a decision on the need for an effective controlling system in the company is taken. The practice of companies shows that the decision on the establishment of the system of controlling should not be taken in a situation characterized by a sharp decline in the main indicators of its activity. The most favorable point is the appearance of the first, even slightly visible signs of possible risks to the future successful operation of the enterprise.

An important aspect when deciding on the implementation of controlling is the availability of sufficient financial resources of the enterprise, in particular related to the need to train their own company specialists, that is train controllers, or use external consultants of controlling.

In addition, it is also important to take into account the psychological climate of the enterprise team members, formed at the time of the decision making. The most favorable situation is a steady financial condition. Involving additional funds for the implementation of controlling at an enterprise during its unstable operation is unlikely to find the approval of the team members, it could rather cause some indignation over unjustified costs of management improvement in terms of staff.

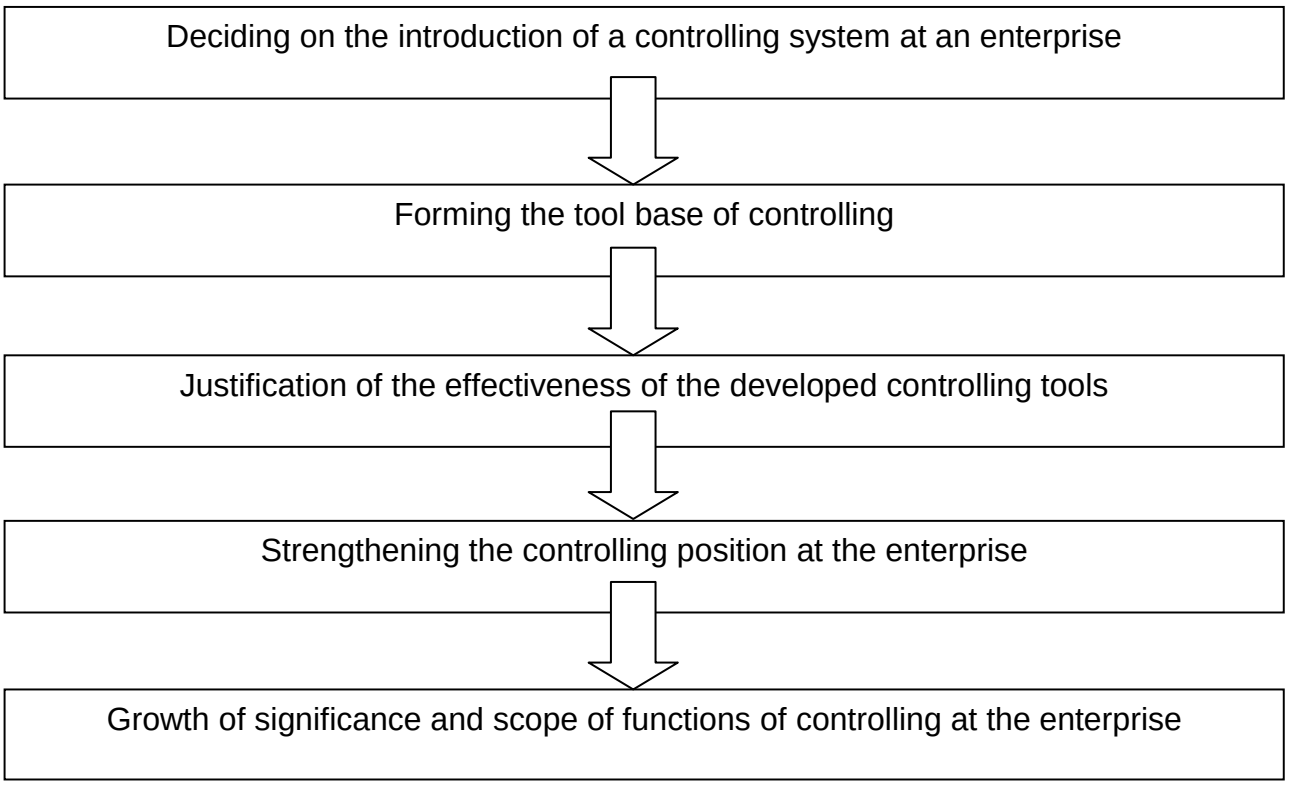

Fig. 7.1. **The main stages of implementing controlling at an enterprise**

The second stage is the formation of the instrumental base of controlling. It begins after the decision on the introduction of controlling in the enterprise activity has been made and the executors of the process have been appointed. This stage is accompanied with the beginning of creating the controlling service at the enterprise.

The implementation of the tools of controlling in the management practices should be preceded by the development and adaptation of these tools to the specific conditions of the enterprise. In view of this, the following controlling tools have to be developed:

a system of planning (strategic and operative) and budgeting at the enterprise;

methods for calculating costs based on the type, place of origin and products;

a system of reporting, targeted at specific users at the enterprise level;

methods for analysis of deviation of the actual values of indicators from the plan;

a method for calculating the contribution margin of an enterprise, its individual departments, products, etc.

a method for calculating the efficiency of investment, the current activities of the enterprise.

All the developed controlling tools must be recognized and approved by their users at the enterprise for further effective use of each of them in practice.

The third stage implies justification of the developed controlling tools effectiveness. It lasts long enough, for 2 to 3 years, depending on the degree of understanding by the top management of the importance of controlling at the enterprise.

The main indicators of the onset of this stage are:

a clear and understandable presentation of the results of the activity of the objects analyzed;

interpretation of the activity of the enterprise units which is sufficiently convincing to managers;

high level of managers' trust in controllers;

willingness of managers to cooperate and communicate with controllers.

In the course of this stage there may be some difficulties. In particular, objective information on the efficiency of the enterprise department activity provided for managers by employees of the controlling services may be unapproved by the heads of the respective services. This situation may slow the process of adapting the system of controlling at the enterprise and, in some cases, even cause the actual removal of the controlling unit from participation in the management process. It means that the controlling unit will only execute the formal procedures: develop certain techniques, instructions, provisions that will not be used in the practice of the enterprise and will not be engaged in performing management functions.

Yet, if the stage of justification of the developed controlling tools effectiveness is successfully completed, the next stage starts, which provides strengthening the controlling position at the enterprise. The beginning of this phase manifests itself in:

an increase in managers' satisfaction with the results of the controller's activity;

increased mutual activities and communications of managers with the workers of the controlling service;

the appearance of signs of improvement in the work of units using the results of the controllers' work;

inability of units' management to implement effective operational activity without the intervention of the specialists of controlling;

receiving the controlling service at a higher hierarchical level in the organizational structure of the enterprise and expansion of the tasks undertaken by it.

All these signs indicate that the controlling at the enterprise has successfully entrenched, that is the controlling service has established both organizationally, and instrumentally and the controlling system has been recognized and spread in the enterprise divisions.

The last stage of introduction of controlling at the enterprise, aiming to increase the significance and scope of controlling functions, remains quite a distant prospect for many enterprises. Yet, leading companies of foreign countries have already demonstrated the onset of this phase. It is characterized by:

a growing importance of controlling specialists who play a leading role in the formation of the most important indicators of the company for the planning period;

controllers' exploring new areas of enterprise activity, for example, wide spread of controlling in the functional units (marketing controlling, logistics controlling, etc.);

involvement of controlling specialists in the process of developing long-term company goals together with higher leadership;

creating a strategic controlling unit within the controlling service.

Tasks, tools and functions of controlling are constantly improving due to the changes occurring in the business external environment.

In most domestic companies controlling has not received sufficient recognition yet. Implementation and extension of controlling functions in the company largely depends on the top management understanding of the need and importance of this kind of activity in ensuring management efficiency.

7.3. The place of the controlling service in the enterprise organizational structure

Once you are sure about the necessity for implementation of controlling in business, the management has to decide what is appropriate: the creation of an independent service or distribution of controlling functions between the available structural units (planning, production, accounting, sales, etc.). Therefore it is necessary to weigh the benefits and drawbacks of the controlling service at the enterprise.

The benefits of an independent controlling service include the following:

the availability of a controlling expert in the company, a particular person responsible for the work;

concentration of information on financial and economic performance in one place, which allows the managers to rapidly receive information when necessary;

new opportunities for rapid implementation of common procedures and methods of planning, accounting and reporting, which will significantly improve the quality of these processes and help to facilitate computerization of the management process;

a possibility of effective coordination of all business units.

The disadvantages of an independent controlling service include the following:

the need to change the usual organizational structure, which may cause dissatisfaction of the team members and a necessity to explain these changes;

certain problems with the units which will have to perform additional functions;

difficulty in finding a controlling expert, which will likely lead to the need for training some of the company employees, and the question of choice of the person to be trained;

a probably of excessive growth of the controlling service and rejecting it by the team.

The decision on the organization of the controlling service in the company depends on the size of the enterprise, and dynamics of changes in its environment. In small-sized enterprises controlling functions are imposed on the chief accountant, whose responsibilities are to conduct analytical accounting and budgeting. Large companies create special departments, whose tasks include coordination of the management and control processes.

It is important to decide whether controlling functions can be distributed between the available departments or it is better to create an independent controlling service.

There are some drawbacks to fixing the controlling functions between the available units and officials. For example, when controlling is fixed under the accounting department, then, because of the accounting system orientation to the past, the chief accountant or his deputies are unlikely to realize the tasks of controlling focused on the future. When the functions and tasks of controlling are assigned to all functional departments, it is difficult to organize their coordination.

So, rejecting the establishment of an independent controlling service in the company has significant drawbacks, they are as follows:

decentralized implementation of controlling tasks increases workloads on the existing departments;

the company will not have a competent professional person, who can independently and neutrally evaluate the decisions taken;

implementation of controlling functions requires special knowledge of the methods and tools of controlling.

It should be noted that in foreign practice there is no single approach to the organizational assignment of controlling functions. In US companies the controlling function is often performed by the commercial director (deputy director for economy), who is subject to the departments and services of external accounting, management accounting, production and so on.

In Germany, the managerial accounting, statistics departments, planning and forecasting departments are transferred to the administrative authority of the business controller created in medium-sized and large companies. The post of a controlling expert, who usually works in the accounting department, is introduced at medium-sized enterprises. In small companies the function of controlling is assigned to the financial manager.

Since most businesses' organizational structures are characterized by a combination of line and staff units, the type of controlling unit (line or headquarters) should be chosen first at all. The most reasonable solution is a headquarters controlling unit subordinated to senior management.

Company size also determines the need for creating jobs of officials or establishing controlling services in different areas of the company (departments, divisions, subsidiaries, etc.). At large enterprises, project teams with representatives from different company areas can be created to solve strategic problems (e.g., new products), these teams being coordinated by experts of the controlling department.

At the beginning the controlling service may include 3–4 persons united in one working group. The members of the working group make a cohesive team engaged in the execution of analytical projects, providing enterprise managers with the necessary information for effective decision making.

At the initial phase of the controlling service functioning there is no need to engage additional staff in gathering information in the enterprise shops (departments) as filling analytical forms for the controlling service can be imposed on the shop economists. That is, in this period the company controlling service is a small team consisting of highly skilled professionals who have a rather broad range of authorities and access to the total economic information.

As with any financial and economic company, over the period of its formation, the controlling service sets up links with other company units, establishing information cooperation to provide for accurate distribution of functions. Later the controlling service may expand its influence and increase staff,

i. e. in each shop (department) a controller can be appointed to monitor and analyze deviations of the actual parameters from the planned ones, primarily those concerning expenditure.

The most appropriate solution is to subordinate the controlling service directly to the CEO. In this case the main controller receives a fairly high status and independence from the heads of other financial and economic services of the company.

7.4. The structure and composition of the controlling service

As has been noted, the company controlling service consists of several controllers, each of whom has their duties, but they all work in a team performing any analytical task.

The most rational structure of the controlling service is shown in Fig. 7.2 [12; 17].

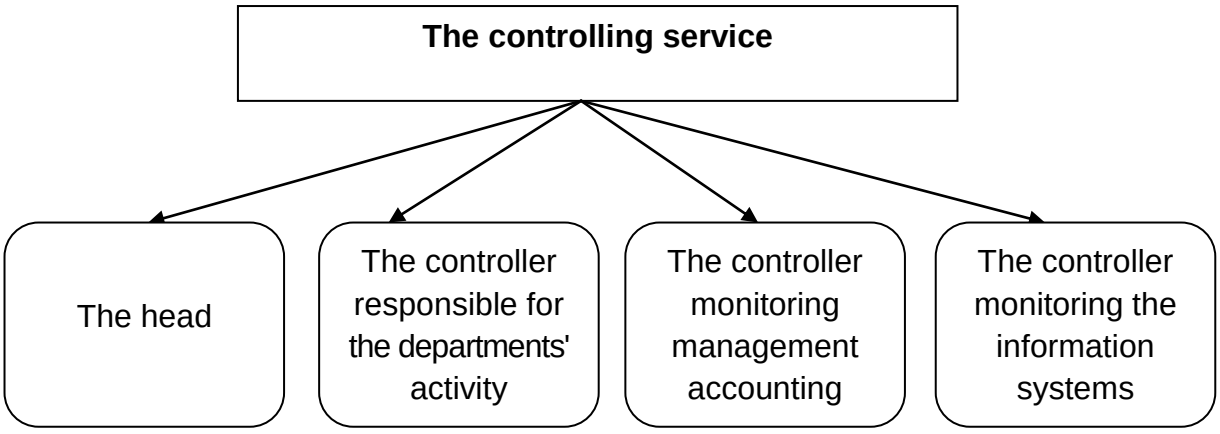

Fig. 7.2. **The composition of the controlling service**

Let us consider the basic responsibilities of each member of the controlling service.

The head of controlling is the most qualified person having sufficient experience in the company, knowing the specifics of its activities, the principles of accounting and planning. He/she must know accounting, understand the technological issues of the enterprise activity. The head of controlling is responsible for the outgoing documents, analytical calculations, forecasts to his supervisor, Chief Financial Officer (CFO) and Director General.

The controller responsible for the departments' activity is also a qualified specialist who is familiar with the organizational aspects and problems of all

departments of the enterprise, and understands the specific of work and technological aspects of each department.

The main duties of the controller for the departments' activity include:

development of forms of gathering analytical information on the departments of the enterprise;

gathering analytical information on departments (responsibility centers);

processing and analyzing the information received, the development of standards of expenses for departments;

calculation of activity indicators of all departments and the enterprise in general in the analytical section;

forecasting key indicators: cost, profit, revenue using the techniques of controlling;

analysis of the actual and planned values of activity: defining deviations, determining the causes of deviations, identifying the perpetrators;

preparing analytical reports for senior management;

examination of management decisions related to the costs of departments.

The controller monitoring management accounting is a specialist able to think analytically, offer theoretical propositions and controlling instruments. Such a specialist should know the theoretical and practical aspects of accounting at an enterprise, as well as features and drawbacks of accounting of the particular enterprise.

The main duties of the controller monitoring management accounting are:

development of procedures for data services transfer from the accounting department to the controlling service;

control over the collection and analysis of actual accounting information in the controlling service;

development of recommendations for the optimization of the accounting process in the accounting department from the position of the analytical service;

economic examination of management decisions.

The controller monitoring the information systems is a qualified person who knows in detail the specifics of the document flow at the enterprise and is able to set the task of automatization of controlling work.

In order to fully provide the controlling service function, it is necessary to optimize all the information flows at the enterprise in order to automate the financial and economic activity. Gathering analytical information should be maximally automated to avoid mistakes and incorrect presentation of information.

Thus, the main responsibilities of the controller monitoring the information systems include:

assessment of the feasibility of automation of controlling at each stage;

evaluation of specific proposals and options for automation of controlling at the enterprise put forward by the Department of Automation with the calculation and substantiation of the necessary expenditure;

preparation of forms for automated collection of information; optimization of the system of workflow at the enterprise;

evaluation of the quality of functioning of the systems of automation of financial and economic activities in order to develop proposals concerning the improvement of their work.

The joint teamwork of all employees of the controlling service helps to implement all function of controlling and brings management activity to a new level.

Questions for self-study

1. The features of introduction of the controlling system at an enterprise.
2. Information flows in the controlling system.
3. Factors contributing to and hindering the introduction of controlling.
4. The duties of specialists of the controlling service.

Questions for self-assessment

1. What is the structure and composition of controlling services in a company?
2. What are the main requirements for creating a controlling service in a company?
3. What place should the controlling service occupy in the organizational structure of a company?

8. Practical and situational tasks

Guidelines

Carrying out practical calculation and situational tasks provides a preliminary examination of theoretical issues on each of the presented themes, in particular,

consideration of the types of controlling, their instruments, classification of costs in controlling, costing methods, budgeting basics, features of investment projects controlling, decision making based on relevant information, decision making based on the CVP analysis, features of break-even analysis.

When doing tasks, especially situational ones, students should not only draw conclusions but also give recommendations on the basis of the information analysis.

The basic theoretical principles and formulas that must be used in carrying out the tasks are contained in the text of respective themes.

Tasks

Task 1

Determine the reasons for introduction of controlling in a company, and provide an explanation of each reason:

the need for improved management tools;

development of a market economy;

the global economic crisis;

increased competition;

globalization of the economy;

growth of production expenses;

the need for creation of an additional practical basis to support the basic functions of management.

Task 2

Determine what tools are connected with strategic and operative controlling:

portfolio and investment analysis;

functional-cost analysis;

methods of costing;

dynamic methods;

budgeting;

current analysis and control of deviations;

benchmarking;

SWOT-analysis;

operation CVP-analysis;

analysis of profitability, liquidity, labor productivity.

Task 3

A large department store sells a wide range of goods from clothing to household appliances. Department has 12 sales departments, a storeroom, an accounting department and administration. At the end of each quarter, the head of each department receives a copy of the report on income in the form presented in Table 1.

Table 8.1

Profit and loss report

Indicator	Amount
1. Revenue from sales (net sales)	10 700
2. Cost of sales (cost of goods sold)	4 200
3. Gross profit	6 500
4. Administrative expenses	1 900
5. Selling expenses	1 400
6. Operating income	3 200

The department store management is concerned about the profit in the third year being lower than expected, and has concluded that in some departments steps should be taken to promote sales. Accordingly, a meeting of all department heads has been scheduled to:

identify the causes of profit deviation from the expected values;

suggest measures to improve the internal reporting.

Explain the usefulness of the consolidated report for managers, suggest possible topics for discussion at the meeting.

Suggest measures to improve the internal reporting.

Task 4

The expenses of an assembly workshop include:

1) wages of production workers;

2) direct materials;

3) overtime payment;

4) payment of electricity for technological needs;

5) rent of premises;

6) utility payments.

Classify each type of expenses into controllable and noncontrollable by the head of this workshop and justify the assignment.

Task 5

Determine which of these costs of the thermal power plant are variable, and which are fixed:

1. Fuel for technological needs.
2. Water for technological needs.
3. Basic wages of production workers.
4. Additional wages of production workers.
5. Deductions to the pension fund.
6. Amortization of the fuel warehouse building.
7. The cost of maintenance and operation of the plant equipment.
8. The costs of preparation and development of production.
9. The fee for the truck rental.
10. Expenses for the chemical cleaning of water.
11. Purchased electricity.
12. Salaries of the administrative personnel.

Task 6

The restaurant average expenses for food and drinks are 15 USD per visitor. Fixed costs are 1000 USD per week.

Determine how much one portion will cost, in the case of one visitor, 10, 50, 100, 200, 400 visitors coming in a week. Present the change in the cost graphically.

Task 7

The annual sales volume of a company amounted to 50 000 units of products at a price of 20 USD. The annual trade expenses include:

advertising costs, 10 000 USD;

salary of employees for product sales, 80 000 USD;

business trip expenses, 50 000 USD.

Managers are considering the establishment of a new market in another region next year. They are planning to increase advertising costs by 30 % and add sales positions with a salary of 1 250 USD per month which would deal with the sale of goods in the new market. It is also expected to increase business trip expenses by 10 % per year. The rent of trading premises in the new market is 10 000 USD. The annual target sales volume in the new market sales is 10 000 units, variable costs per unit of product are 5 USD.

Is it advisable for the company to open the new sales market?

Task 8

The company previously purchased 400 USD worth of material. But it turned out that either selling or using it in the future is impossible. A buyer has ordered a product in which this material can be used, and for which he is willing to pay no more than 850 USD. Additional costs of processing the product will be 700 USD.

Is it appropriate for the company to accept the order at the price of 850 USD? Write a conclusion.

Task 9

A company is making a decision whether to buy a part or produce it by itself. The cost of purchasing the part is 42 UAH, producing it in the company will cost 67 UAH. The required number of parts is 1 600 pcs. The fixed costs of production are 21 UAH.

What is profitable: to buy or to produce the part? Write a conclusion.

Task 10

A consulting firm, which trains managers, is going to hold a one-day seminar. It has spent 1 500 UAH for printing 2 000 brochures and mailing them to prospective customers. It has rented a conference hall for 750 UAH per day. Food and drinks (coffee break) will cost 26 UAH per person. The penalty for refusing to rent is 20 % of the rent. The lecturer requires 900 UAH for delivering lectures at the seminar. The handout costs will make 11 UAH per person. The participants will pay 480 UAH per day. Four people have been registered a week before the seminar.

Is it necessary to cancel the seminar? With how many participants will the company cover all the expenditures?

Task 11

The company "Congo" wants to buy from the company "Energy" 100 pumps at a price of 900 UAH despite the fact that their normal price is 1 150 UAH. The accountant made up a special order calculation which is shown below:

direct materials: 50 000 UAH;

direct labor: 18 000 UAH;

manufacturing overhead costs (including 60 % fixed costs): 20 000 UAH;

distribution (selling) costs (including 40 % fixed costs): 14 000 UAH;

total costs: 102 000 UAH.

Is it appropriate for the company "Energy" to accept the order?

Task 12

Determine the amount of overhead costs attributable to each product if their amount is 148 000 UAH (Table 8.2).

Table 8.2

Indicators	Product		
	A	B	C
The annual program of production, units	1 800	1 100	2 800
Direct materials per unit, UAH	84.5	102.3	142.8
Direct labor per unit, UAH	24.8	89.4	38.2

Choose an allocation base, substantiate and calculate the manufacturing cost of the product.

Task 13

A small company has two workshops: stamping and assembly. Labour hours of workers (direct labour hours) are used as a base for allocating overhead costs.

It is necessary to justify the ability to use:

a) a unified rate of overhead allocation for the enterprise as a whole;

b) different rates for each workshop, preselecting the base of distribution.

The initial data for the calculations are given in Table 8.3.

Table 8.3

Indicators	Stamping workshop	Assembly workshop	Total
Annual overhead costs, UAH	59 200	88 800	148 000
Labour-hours per year	11 100	25 900	37 000
Machine-hours per year	23 040	11 520	34 560

Explain the impact of different approaches to the accuracy of costing.

Task 14

A company produces five types of products. Based on the data in Table 8.4 you should:

1. Determine the profitability of production and profitability of each product.

2. Clarify the allocation of fixed indirect costs on product and profitability of the product.

3. Make a decision about production of each type of product.

Table 8.4

Indicators	Product					Amount, USD
	A	B	C	D	E	
Price per unit, USD	75	58	100	90	54	
Production volume, units	650	420	180	750	2000	
Variable costs per unit, USD	38	35	72	81	32	
Fixed indirect costs per unit, USD	20	20	20	20	20	

Task 15

An enterprise produces only one kind of product. The expected volume is 4 000 pcs. The expected overhead costs are 8 000 USD, the direct costs per unit are 10 USD. The actual overhead costs are 8 000 USD.

Determine the overhead rate and calculate the total cost per unit if production is 2 000 pcs, 8 000 pcs.

Determine what the selling price of products should be in each case (when changing the volume).

If the product price is 12 USD, what should the volume of production be to make profit?

Task 16

A furniture factory produces two main products: tables and chairs. Profits and losses per month are shown in Table 8.5.

Table 8.5

Indicators, thou	Tables	Chairs	Total
Revenue	300	200	500
Direct expenses	150	150	300
Contribution margin (gross)	150	50	200
Fixed indirect costs	50	50	100
Profit from sales (operating profit)	100	0	100

After analyzing the accounting data, which alternative solutions can managers take?

1. Stop manufacturing of chairs and manufacture tables only.
2. Increase the price of the chairs.

3. Reduce the cost of production of chairs.

4. Clarify the allocation of indirect costs.

Substantiate the proposed solutions.

Task 17

Determine the marginal cost (variable cost) of a product, the contribution margin, the contribution margin ratio if the selling price of the product is 520 UAH. The cost of manufacturing products includes the following (Table 8.6).

Table 8.6

Direct material	144 UAH
Direct labor	128 UAH
Other direct costs	54 UAH
The cost of the motor energy	28 UAH
Transportation costs	25 UAH

Task 18

Variable costs per item are 5 USD. The company may sell products – 43 000 pcs at a price of 8 USD; 104 000 pcs at a price of 7 USD; 134 000 pcs at a price of 6 USD.

Determine which of the options provides the greatest contribution margin.

Task 19

A company produces four types of products with the following characteristics (Table 8.7):

Determine the contribution margin and the contribution margin ratio for each product.

What is the right order to make the production profitable and satisfy the demand for these products?

Table 8.7

Indicators	Product			
	A	B	C	D
Price, UAH	150	200	300	400
Marginal (variable) cost, UAH	120	150	200	250

Task 20

Using the ABC costing method, allocate the costs of making up an order for delivery of materials per unit of product, taking into account the following conditions:

1) the number of manufactured products per month: 200 pcs of A (bronze items); 300 pcs of B (steel items);

2) 50 orders for delivery of bronze and 30 orders for delivery of steel were made up during the month;

3) the total cost of making up the orders for delivery was 4 800 UAH.

Task 21

A company makes four types of products. The limiting factor is the fund of the working time of equipment which makes 3 000 machine-hours per month. Fixed costs make 10 000 USD per month.

It is necessary to maximize the profits by analyzing the demand for each product and the contribution margin per unit of the limiting factor.

The data for calculations are presented in Table 8.8.

Table 8.8

Indicators	Product				Total
	A	B	C	D	
Demand for the month, units	1 000	1 000	500	500	
Machine-hours per unit	0.5	0.75	2	5	
Contribution margin per unit, USD	3	5	10	15	

Task 22

A company makes products A and B. The price of product A is 10 USD, of product B it is 15 USD. Variable costs per unit of product A are 7 USD, of product B they are 9 USD. The limiting factor is the fund of the equipment working time which is 1 000 machine-hours. 3 units of product A or 1 unit of product B per hour can be produced.

Determine the contribution margin per unit and the contribution margin per unit of the limiting factor. Decide which product is more profitable to produce.

Task 23

Using the concept of the Target Costing, determine the target cost of the new appliance. Based on the market research the predicted price is 280 USD, the target sales are 1 200 units. The target profitability is 11 %.

Task 24

A company was informed of two branches' operation results in the previous quarter. The data for the analysis are shown in Table 8.9.

Table 8.9

Indicators	Branch A	Branch B	Total
Revenue	87 000	63 000	150 000
Variable costs	42 000	36 000	78 000
Marginal profit (contribution margin)	45 000	27 000	72 000
Fixed costs:			
Manufacturing	21 000	22 500	43 500
Administrative	5 000	4 500	9 500
Selling	11 500	6 000	17 500
Operating profit (loss)	7 500	(-6 000)	1 500

Based on the analysis of the information, the managers are considering the closure of branch B as an unprofitable (loss-making) one. Determine how it will influence the company's operation results if it reduces the fixed manufacturing costs by 8 000 USD, and the marketing costs (selling costs) by 2 000 USD.

Task 25

Two firms, A and B, sell product G. Firm A sells many products, whereas B sells only product G. The cost structure for manufacturing product G is as follows (Table 8.10):

Table 8.10

Indicators	A	B
The total absorbed costs, USD	10	8
Profit, USD	2	2
Price, USD	12	10

If price is the decisive factor, then firm B will capture the market of product G.

Firm A has decided to analyze its costs once more and discovered the following (Table 8.11).

Table 8.11

Fixed costs per unit, USD	5
Variable costs per unit, USD	5
The total cost, USD	10

What is the price of product G that firm A must establish, in order to maximize its profit and outcompete firm B?

Task 26

A company produces four types of products (Table 8.12).

The throughput of the equipment (the limiting factor) is 8 000 machine-hours per month. Fixed costs are 2 480 USD per month.

Table 8.12

Indicators	Product A	Product B	Product C	Product D
Price, USD	35	45	55	70
Variable cost, USD	22	25	35	40
Demand per month, units	2 500	230	1 000	1 100
Machine-hours per unit	1.5	1.0	3.2	7.9

It is necessary:

1) to calculate the contribution margin and the contribution margin ratio;
2) to rank the products in accordance with profitability;
3) to maximize the profit from sale by analyzing the demand for each product and the contribution margin per unit of the limiting factor.

Task 27

Choose the price and determine the sales volume which is required to maximize the total contribution margin (Table 8.13).

Table 8.13

Possible selling price, USD	Variable costs, USD	Sales volume, pcs
60	55	10 000
70	55	7 000
80	55	3 000

Task 28

A sales manager had been on 3 business-trips to sell 300 pcs of product A and 5 business-trips to sell 430 pcs of product B. The total travelling allowance amounted to 880 USD that month. Determine the amount of travelling allowance attributable to each product.

Task 29

Calculate the contribution margin and the operating income on the basis of the data presented in Table 8.14.

Table 8.14

Indicators	Products			Total
	A	B	C	
Revenues from sales (net sales)	375 000	270 000	60 000	
Variable costs, including				
direct materials	45 000	18 000	1 500	
direct labor	75 000	63 000	4 500	
manufacturing overhead	180 000	54 000	36 000	
Total variable costs				
Contribution margin				
Selling costs				54 000
Administrative costs				96 000
Operating income				

Task 30

The results of enterprise's activity, which produces three types of products, are presented in Table 8.15.

Table 8.15

Indicators	Product A	Product B	Product C	Total
Sales volume, units	500	600	200	
Price, USD	2	5	10	
Direct materials, USD	400	1 500	1 000	
Direct labor, USD	200	600	600	
Overheads, USD:				
variable	100	100	200	400
fixed	200	200	300	700
Total cost, USD	900	2 400	2 100	5 400

It is necessary to analyze the profitability of products using the contribution approach and decide on the appropriateness of production.

Task 31

The company "Comfort" produces thermal mugs. The director asked the employees to draw up a flexible budget. For the planned year the flexible budget was worked out for several possible levels of activity, particularly for three sales

volumes: 2 800, 3 200 and 3 600 of thermal mugs. The price of a thermal mug is 155 UAH. Variable costs per unit are as follows: manufacturing costs make 105 UAH, selling costs amount to 4 UAH. Fixed costs for the company are planned in the amount of manufacturing costs making 91 400 UAH, selling costs amounting to 48 600 UAH. The method of direct costing was used for planning.

It is necessary to draw up a flexible budget, evaluate it and choose the most effective option.

Task 32

In accordance with the results of calculations of the previous task the director chose a flexible budget which corresponds to the output of 3 600 thermal mugs. But in fact, during the year, the company "Comfort" was able to make and sell only 2 800 thermal mugs. The reported data on the planned budget execution are presented in Table 8.16.

Table 8.16

Indicators	Fulfillment
Sales volume, unit	2 800
Revenue, UAH	434 000
Variable costs, UAH:	
manufacturing	299 160
selling	13 800
Fixed costs, UAH:	
manufacturing	92 000
selling	48 600

It is necessary to compare the planned and actual budgets, assess the results of the company activity and identify the possible causes of variances.

Task 33

A manager presented to the company's management the data on the implementation of the profit plan for July of the current year with the indication of the plan performance (underperformance) (Table 8.17).

Table 8.17

Indicators	Value, USD	Implementation, %
Actual operating profit	280	1.25
Budgeted operating profit (plan)	22 400	100
Budget variances	22 120	98.75

The deviation of 98.75 % towards the underperformance is not acceptable for the company's management and they asked the manager to make a thorough analysis. To do this, the manager compared the actual implementation with the plan (the static budget) of the main indicators (Table 8.18).

Table 8.18

Indicators	Actual		Static budget		Variances
	Value	Share, %	Value	Share, %	
Output, units	2 000		2 400		
Price, USD			70		
Sales, USD	144 000		168 000	100	
Variable costs, USD	109 320		110 400	65.7	
Contribution margin, USD	34 680		57 600	34.3	
Fixed costs, USD	34 400		35 200	20.95	
Operating profit, USD	280		22 400	13.35	

1. Determine which factors impacted on the negative deviation of the total profit by analyzing the absolute and relative values of the indicators.

2. Calculate the flexible budget for the relevant range of 1 800, 2 000, 2 200 and 2 600 units of output on the basis of the following data (Table 8.19).

Table 8.19

Indicators	Cost per unit, USD	Options of output			
		1	2	3	4
Output, units		1 800	2 000	2 200	2 600
Sales, USD	70	126 000	140 000	154 000	182 000
Variable costs, USD:					
direct materials	20	36 000	40 000	44 000	52 000
direct labor	16	28 800	32 000	35 200	41 600
manufacturing	3	5 400	6 000	6 600	7 800
Total variable manufacturing costs					
Variable sales and administrative costs	7	12 600	14 000	15 400	18 200
Total variable costs					
Contribution margin, USD					
Fixed costs, USD:					
manufacturing		19 200	19 200	19 200	19 200
sales and administrative costs		16 000	16 000	16 000	16 000
Total fixed costs		35 200	35 200	35 200	35 200
Total costs, USD					
Operating profit, USD		8 000	12 800	17 600	27 200

3. Compare the actual results of the plan performance with the flexible budget and analyze the identified deviations as aggregated and detailed by the costs. The aggregate analysis can be carried out in Table 8.20.

Table 8.20

Indicators	Actual, USD	Deviation from the flexible budget		Deviation from the static budget	
		Flexible budget, USD	Deviation, USD	Static budget, USD	Deviation, USD
1	2	3	4	5	6
Output, units	2 000	2 000		2 400	
Sales, USD					
Variable costs, USD					
Contribution margin, USD					
Fixed costs, USD					
Operating profit, USD					

The cost deviation is determined by the flexible budget taking into account cost standards accepted for the calculation (Table 8.21).

Table 8.21

Indicators	Actual, USD	Flexible budget, USD	Deviation, USD
Output, units	2 000	2 000	
Variable costs, USD:			
direct materials			
direct labor			
manufacturing			
Total variable manufacturing costs			
Variable sales and administrative costs			
Total variable costs			
Fixed costs, USD:			
manufacturing			
sales and administrative costs			
Total fixed costs			
Total costs, USD			

Task 34

A company is considering three investment projects of capital investments in equipment. The implementation of each of them requires investments in the amount of 63 000 UAH. Each project is designed for three years and provides the following cash flows (Table 8.22).

Table 8.22

Year	Project		
	New national equipment	Worn-out foreign equipment	New foreign equipment
1	22 500	28 500	39 000
2	27 000	28 500	27 000
3	45 000	28 500	33 000

The equipment has no liquidation value. The discount rate is 15 %.

1. Determine the payback period for each project and choose the best one.
2. Calculate the net present value of each project, and also choose the best one.

Will your choice change in the second case?

Task 35

A company decided to acquire equipment worth of 45 840 UAH. The period of its exploitation is 6 years with a zero salvage value. The expected yearly economy of money resources is shown in Table 8.23.

Table 8.23

Year	Amount, UAH
1	7 800
2	6 240
3	4 680
4	3 900
5	3 120
6	4 680

The discount rate is 11 %.

Calculate the net present value of the equipment, the payback period and the internal rate of return.

Task 36

The company has an opportunity to invest 100 000 UAH in the project of modernization of the production area. The annual cash flows arising from its implementation are expected in the amount of 60 000 UAH within three years. Determine the net present value of the project. The minimum desired rate of profit is 12 %. Is the project effective?

Task 37

An investor has two options to invest 800 000 UAH. The first option is to put money in the bank on deposit at 70 % per annum. The second option is to put the money for three months at 60 % per annum, then withdraw the money and then again put them for three months and do the same until the end of the year.

Determine which option is more profitable to the investor.

Task 38

An investor has 50 000 UAH and wants to get 250 000 UAH two years later. What should the minimum rate of discount be for this purpose?

Task 39

The company's management has to make a decision whether to modernize the production line for the manufacture of products or not. It is necessary to spend 50 000 USD for the reconstruction. The sales volume is 100 000 units. The selling price is 12 USD. The costs per unit are: 8 USD for materials; 4 USD for wages before modernization and 3.8 USD after modernization; fixed costs make 2.5 USD. Is it advisable to upgrade the production line?

Task 40

A company is going to close its plant in the city "A" where cars are made. A regular customer wants to order one last car before the plant is closed. Can the company take the order under the following conditions?

It has accumulated a significant stock of materials for the production of the car frame in a warehouse the initial cost of which was 3 000 USD. But the company can sell it for 950 USD.

There is a large stock of motor parts in the warehouse whose initial value is 2 200 USD. They can be transported to another plant of the company, it will cost 300 USD. It is assumed that the plant will pay for them 2 000 USD.

The expected workers' wages and the variable overhead costs amount to 2 800 USD.

An engineer will need to go on a business trip for a week from the city "A" for the period of making the car. His salary is 300 USD, the travelling allowance is 400 USD.

The fixed costs are reimbursed at a rate of 2 USD per 1 USD direct costs.

The expected order price is 7 000 USD.

Task 41

A company has surplus production areas it may lease at a cost of 10 000 USD per year. But the sales manager is thinking of taking an order amounting to 30 000 USD.

The initial cost of material that will be used to fulfill the order was 12 000 USD. But its market value is 3 000 USD. The wages of workers who would be filling this order is 15 000 USD. The variable overhead costs are 8 000 USD. The fixed costs are reimbursed at a rate of 1 USD of the fixed cost per 1 USD of the cost of direct labor.

Is it profitable to accept the order?

Task 42

A company's managers must solve the problem whether make or buy the parts. The annual demand for parts is 10 000 pcs.

The cost of manufacturing the parts is:

direct materials make 6 UAH;

direct labor is 3 UAH;

variable overheads are 3.5 UAH;

fixed overheads are 5.5 UAH;

total cost is 18 UAH.

It is supposed that these parts can be bought for 16 UAH per unit.

What decision will the company's management make:

1) to produce the parts at the enterprise;

2) to buy the parts and let the idle equipment;

3) to buy the parts and use the equipment for the production of other parts with a contribution margin of 19 000 UAH;

4) to buy the parts, and lease the equipment for 5 000 UAH?

Task 43

A company is considering the option of replacing a machine tool. The volume of production and revenue do not change making 100 000 USD per year. The following information is available for making a decision:

as to the old machine tool:
the initial cost of the machine tool is 120 000 USD;
the residual value is 40 000 USD (depreciation is 80 000 USD);
the liquidation value is 40 000 USD;
the residual lifetime is 4 years with a zero liquidation value;
the variable costs per year are 80 000 USD;
as to the new machine tool:
the price is 60 000 USD;
the lifetime is 4 years with a zero residual value;
the variable costs per year are 56 000 USD.
Is it advisable to replace the machine tool?

Task 44

A company sold 1 088 units of product at a price of 90 UAH. Variable costs per unit are 50 UAH, fixed costs of the company are 22 520 UAH, the income tax rate is 18 %.

Determine the number of sales items if it is necessary to obtain the net profit amounting to 23 940 UAH.

Task 45

The results of operating activities of the company that produces cameras are presented in Table 8.24.

Table 8.24

Indicators	Report		Plan	
	Expenses	Income	Expenses	Income
1. Revenue		120 000		
2. Direct materials	40 000			
3. Direct labor	24 000			
4. Overheads	36 000			
including variables	6 000			
fixed	30 000			

1. It is planned to reduce the selling price by 10 %, which should increase sales by 50 %.

2. The price of the materials that make up half the cost of all the necessary materials will increase by 10 %.

3. The hourly wage rate will increase by 5 %.

4. 20 000 USD of the total overhead costs are unchanging fixed costs, and 10 000 USD are regulated costs, and the manager is going to make some arrangements to save 2 000 USD.

5. 6 000 USD of the overhead variable costs vary with output.

1. Determine the planned operating profit for the year under planning.

2. Calculate the breakeven point and the margin of safety percentage for both years.

3. What problems should draw the attention of the manager before the beginning of the year under planning?

Task 46

The managers gave a task for the economist to study the economic condition of the enterprise according to the following conditions:

product price is 10 USD;

variable costs per unit are 5 USD;

total fixed costs are 15 000 USD.

Determine:

1. The break-even point in units and dollars.

2. The possible sales volume to get 6 000 USD profit after taxes (net profit). The income tax rate is 18 %.

3. The possible sales volume if the profit is 10 % from the received sales volume.

Task 47

Determine the possible profit for the year under planning. During the year, the production volume amounted to 10 000 units, the sales price was 60 UAH, the variable costs per unit were 40 UAH, the total fixed costs made 40 000 UAH.

The production volume is expected to grow by 5 % and the unit (per unit) costs are to reduce by 4 % in the planned year. The fixed costs will decrease by 5 000 UAH.

1. Determine the operating profit in the year under planning.

2. How will the profit change, if the basic variable costs rise by 8 %, and the price decreases by 4 %?

Task 48

The director of a company has decided to increase the workers' wages in the next year by 20 %. He asked the economist to justify the plan for the next year. The reported data for the previous year are as follows:

the annual output of products is 10 000 units;
the price per unit is 40 UAH;
costs per unit:
direct materials are 15 UAH;
direct labor is 6 UAH;
overhead variable costs are 3 UAH;
annual fixed costs are 45 000 UAH.
Determine:

1. How much should the selling price be increased to cover the wage increase by 20 % and keep the level of the contribution margin at 40 %?

2. How many products must be sold to get the same operating profit as in the reporting year, while maintaining the price of 40 UAH and increasing the wages by 20 %?

Task 49

A company comprises three branches – A, B and C. Over the past month the revenue of the company was 520 000 USD, the variable costs made 390 000 USD, the fixed costs amounted to 180 000 USD. The report of the branches' activities per month is shown in Table 8.25.

Table 8.25

Indicators	Revenue, USD	Variable costs, USD
Branch A	180 000	80 000
Branch B	200 000	140 000
Branch C	140 000	170 000
Company	520 000	390 000

1. Calculate the contribution margin ratio and the break-even point for the company and draw the profit-volume graph.

2. Calculate the contribution margin ratio for each branch.

3. What actions can the management of the company take based on the data?

Task 50

A company expects to make 5 000 USD in profit. Variable costs per unit are 25 USD, the sale price is 45 USD, the company fixed costs are 10 000 USD.

1. What should the sales volume be to get the target profit?

2. Will the sales volume change if the fixed costs increase by 10 %?

Task 51

The company produces 44 % of product "A", 18 % of product "B" and 38 % of product "C". The contribution margin per unit of product "A" is 28 UAH, for product "B" it is 14 UAH, for product "C" it makes 38 UAH. The fixed costs of the company are 27 000 UAH.

Determine the break-even point for each product.

Task 52

Determine the break-even point for each type of product based on the data presented in Table 8.26.

Table 8.26

Product	Output, units	Unit contribution margin, USD
A	1 500	12
B	8 200	10
C	3 700	8

The fixed costs for the company amount to 36 000 USD.

Task 53

A company produces one type of product. The output is 18 000 units. The product price is 15 USD. Variable costs per unit are 11 USD. The fixed costs of the company are 97 000 USD. Determine the margin of safety percentage.

Task 54

Determine the additional sales volume if it is necessary to obtain 88 000 UAH of net profit (after-tax profit). The income tax rate is 18 %. The product price is 48 UAH. Variable costs per unit are 32 UAH.

Task 55

The enterprise activity is characterized by the following data:

revenue per year is 50 000 USD;

costs: variable costs are 35 000 USD; fixed costs are 15 000 USD.

Determine what revenue must be received at the breakeven point if the fixed costs increase by 6 000 USD.

Task 56

An entrepreneur rented a shop. The initial payment was 5 000 USD. In addition, the annual rent will be 5 000 USD. If the lease is cancelled, the initial

fee of 5 000 USD will be lost. The entrepreneur plans to use the shop for selling clothes and getting the following results:

the volume of sales with VAT of 120 000 USD;

variable costs of 50 000 USD;

the salary of managers of 12 000 USD;

the fee for heating and lighting amounting to 10 000 USD;

the insurance fee of 1 000 USD;

the auditing costs making 2 000 USD.

But the entrepreneur has not decided yet whether to implement his plans or not, because he can sublease the building for a monthly fee of 550 USD.

What decision should the entrepreneur take?

Task 57

The chairman of a JSC which produces spare parts for pumps has promised to increase the workers' wages by 10 % in the next year. Other changes in costs are anticipated. It is necessary to justify the production plan for the next year. The report for the previous year is as follows:

the annual output of products was 5 000 units;

the price per unit was 80 UAH;

direct materials per unit were 30 UAH;

direct labor per unit was 12 UAH;

overhead variable costs per unit were 6 UAH;

annual fixed costs were 51 000 UAH.

With the help of the break-even analysis, determine:

1. What should the new selling price of spare parts be?
2. How many parts are to be sold to make a profit in the amount of 150 000 UAH?

Task 58

You have got the speciality "manager", you are going to work in a company which is engaged in manufacturing household electrical appliances. Having studied the activity of the company, you have offered to implement the controlling system and create a controlling department in the company.

1. What arguments in favour of this proposition will you offer?
2. What will the controlling department do?
3. Can there be any objections to this proposal, and what are they, if any?
4. You have proposed to introduce a system of accounting and calculation by the method of direct costing instead of the existing one of accounting and

calculation of the full cost (absorption costing) in the company. How will you argue this proposal?

5. Why, in your opinion, must the head of the controlling service be paid more than the head of the financial department?

6. You propose to analyze the variances that arise in the production process of the company, and implement management by exception. Give arguments in favour of your proposal.

7. Can the cost–volume–profit analysis be used in the company to get a certain amount of profit?

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КОНТРОЛІНГ

Навчальний посібник

(англ. мовою)

Відповідальний за видання *О. М. Ястремська*

Відповідальний редактор *М. М. Оленич*

Редактор *З. В. Зобова*

Коректор *З. В. Зобова*

Наведено теоретичні аспекти використання контролінгу на підприємстві: розкрито його значення в управлінні підприємством, описано об'єкти контролінгу (витрати, центри відповідальності), аспекти управлінського обліку як основи контролінгу, особливості бюджетування, питання щодо прийняття управлінських рішень в контролінгу, контролінг інвестиційних проектів та організаційні аспекти створення системи контролінгу на підприємстві. Подано практичні та ситуаційні завдання для закріплення теоретичних знань.

Рекомендовано для студентів вищих економічних навчальних закладів, зокрема тих, що навчаються англійською мовою, слухачів центрів підготовки та підвищення кваліфікації, керівників підприємств.

План 2016 р. Поз. № 16-НП.
Підп. до друку 06.12.2016 р. Формат 60 х 90 1/16. Папір офсетний. Друк цифровий.
Ум. друк. арк. 8,0. Обл.-вид. арк. 10,0. Тираж 50 пр. Зам. № 274.

Видавець і виготовлювач – ХНЕУ ім. С. Кузнеця, 61166, м. Харків, просп. Науки, 9-А

Свідоцтво про внесення суб'єкта видавничої справи до Державного реєстру
ДК № 4853 від 20.02.2015 р.