

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SIMON KUZNETS KHARKIV NATIONAL UNIVERSITY
OF ECONOMICS**

**Guidelines for carrying out practical tasks
on the academic discipline
"BASIS OF SCIENTIFIC RESEARCH"
for students of training directions
6.030601 "Management", 6.140103 "Tourism"
of all forms of study**

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Compiled by: O. Myronova
O. Mazorenko

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Methodical and theoretical material needed to perform the practical tasks is presented. The basic points that will help students in preparing for practical studies and performing independent work on the academic discipline are considered.

Recommended for students of training directions 6.030601 "Management" and 6.140103 "Tourism".

Подано методичний та теоретичний матеріал, необхідний для виконання практичних завдань. Розглянуто основні моменти, які допоможуть студентам у підготовці до практичних занять та виконанні самостійної роботи з навчальної дисципліни.

Рекомендовано для студентів напрямів підготовки 6.030601 "Менеджмент" і 6.140103 "Туризм".

Introduction

Scientific research helps people understand the world around them. Research helps people understand how things work and why certain things look or act the way they do. In addition to satisfying curiosity, research can also help save or prolong human life.

Scientific research helps to acquire, increase and update knowledge, which provides the ability to set research objectives, plan their implementation, organize the collection and processing of information, and create conditions for the generation of new ideas and their implementation.

The scientific method is integral to understanding science. This method teaches the student to analyze and process the information he is receiving. It trains the brain to logically examine and process all the information it receives.

Practical study is a form of instruction in which the teacher organizes a detailed study of some theoretical issues of the academic discipline and forms skills in using them in practice based on student's implementation of individual tasks according to the defined objectives. Practical studies of the academic discipline will form a scientific worldview of future professionals; disclose the essence of general and special methods and principles of research and design results. The basis for this is the knowledge of the scientific research.

These guidelines provide a guide and learning support document in the preparation of practical studies in the sphere of scientific research. They cover such issues as the selection of a scientific research topic, writing a proposal, conducting a literature review, selecting a research approach, devising research instruments, collecting information, analyzing and presenting information and producing a well-written scientific project.

Knowledge gained after performing the practical exercises will help students in mastering new courses, self-study, writing scientific researches, yearly projects and diploma theses, essays, articles etc., as well as outside of the educational process – advocating different views and selecting the most reasoned position.

The structure of the components of the professional competences and their formation on the academic discipline "Basis of Scientific Research" in accordance with the National Qualifications Framework of Ukraine is given in Table 1.

Table 1

**The structure of the components of the professional competences on the academic discipline
"Basis of Scientific Research"**

Components of the competence, which is formed by the theme	Minimal experience	Knowledge	Skills	Communications	Autonomy and responsibility
1	2	3	4	5	6
Theme 1. Science and scientific thinking. Research technology					
The ability to classify sciences, single out their basic features, distinguish the stages of development. The ability to formulate a topic, a problem, aims and tasks of scientific research	Classification of sciences. The main functions of science	Knowledge of the main categories of science: theory, fact, hypothesis, concept, system elements of the theme of scientific research	Distinguishing system elements of the theme of scientific research, structuring the subject area of research	Forming an effective communication strategy of the evolution of science	Responsibility for clear formulation of the topic and identification of the structure elements of research
Theme 2. Methods of working with concepts					
The ability to formulate basic scientific concepts and definitions; establish the relationship between concepts and words	Concept. Significant features of objects	Knowledge of the nature and extent of the concept, the concept of genus and species, rules of formation of definitions	Applying the rules of formation of definitions. Identifying the relationship between concepts and words, distinguishing between genus and species. Carrying out morphological analysis	Presentation of the result of morphological analysis	Responsibility for clear defining the concepts of genus and species

Table 1 (the end)

1	2	3	4	5	6
Theme 3. The technology of working with literature					
The ability to receive, process, and analyze information got from literature	Typology of scientific and technical information, the main types of publications	Knowledge of methods and techniques of information search, methods of study and treatment of references, features of citation	Using the technology of "fast" reading. The ability to find information in the Internet using search engines	Presentation of a literature review	Making independent decisions on effective management and taking responsibility for the correctness and adequacy of the scientific research
Theme 4. Presentation of research results					
The ability to formulate analytical conclusions of the analysis of the literature	Types of results of scientific research	Knowledge of the system elements of the scientific discussion, methods of reasoning in a scientific discussion	Drawing up a scientific report	Presentation of a scientific report	Making effective management decisions and taking responsibility for the reliability and accuracy of the results
Theme 5. Research methods and models					
The ability to apply mathematical methods and models in economic research; construct a mathematical model of the relationship between economic phenomena and processes	Mathematical methods. Methods of economic life researching	Knowledge of the mathematical methods, methods of establishing causal relations, methods of empirical research, methods of theoretical research, stages of modeling	Using different methods of scientific research	Presentation of the result of modeling	Making independent effective decisions on choosing methods of scientific research. Responsibility for correctness and adequacy of the developed models

The structure of the practical studies is given in Table 2.

Table 2

The structure of practical studies

Theme	Questions	Hours
Theme 1. Formulation of themes, problems and goals of scientific research	1. Formulation of themes, problems and goals of scientific research. 2. Structuring the domain of research. 3. Justification of topic relevance and usefulness of the expected scientific results	4
Theme 2. Operations with concepts	1. The wording of the definition. 2. Formation of classification. 3. Identification of essential features of objects that are studied	4
Theme 3. The analysis of scientific publications	1. Analysis of scientific texts. 2. Identification of structural elements of the relevant article of research. 3. Writing annotation	4
Theme 4. Methods of learning, processing and compilation of references	1. Writing synopsis, abstracts of scientific papers (articles, abstracts, books). 2. A bibliography of publications by the subject that is studied	2
Theme 5. Models and modeling in scientific research	1. Classification of models. 2. Empirical studies of economic objects	3

Practical task to Theme 1 Formulation of themes, problems and goals of scientific research

The goal of training is to formulate the topic, the problem and the purpose of a scientific research.

To achieve this goal the following tasks should be solved:

to learn how to formulate the topic, the problem and the purpose of a scientific research in their logical relationship;

to acquire skills at structuring the subject area of a research;

to learn how to justify the actuality of the chosen topic and significance of the anticipated scientific findings;

to gain experience in constructing charts of individuals interested in using research results.

Keywords: a research topic, the actuality of the topic, the objective of the research, object, subject, applied problem, scientific problem, subject area, structural model of the subject area, a chart of interested persons.

The task consists in student's selecting and formulating an individual topic of scientific research. The process of formulating the research topic is iterative, so each of the steps suggested below may involve review and correction of the previous results.

Some steps of the process of formulating a scientific research topic are given below.

Training material

Step 1. Formulation of scientific research topics

There are a variety of topics:

initiative – those that are formulated independently by a researcher;

commissioned – those that are ordered by the state or private organizations;

collective – those that arise as a result of problems on which the particular research group works.

In order to formulate an initiative topic of research it is necessary to find the intersection of the range of researchers' scientific interests, the range of topics that secure information and the range of topics that are relevant (Fig. 1).

Scientific research is the process of collecting, organizing, analyzing, and summarizing the facts and logical thinking.

There are a number of criteria that need to be considered when deciding on your research topic. These are summarized below:

1. *A topic should be realistic.* You need to identify a problem (supported by published materials), investigate the causes and a possible solution. Alternatively, the research subject might cover an office procedure or the appraisal of a particular system. Here you will be investigating what should be done and what is actually done.

2. *Your topic should be specific and narrow.* For example, if you are conducting a detailed case study, do not investigate all the factors that may influence site productivity as a topic, but rather the influence of financial incentives on productivity. You might be tempted to study job satisfaction in the building industry, but this again is too broad. A better way is to narrow it

down and investigate job satisfaction of operatives who are working for small-size firms.

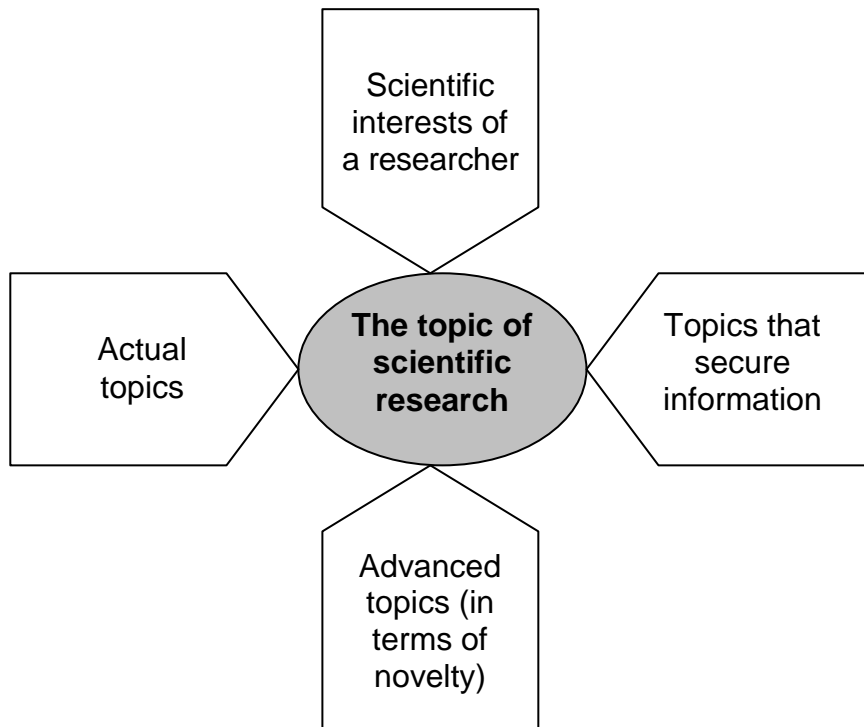


Fig. 1. **The choice of a scientific research topic**

3. *Your topic should show individuality, i.e. your personal contribution to the study.* What is new about your investigation? This can take the form of case studies, a series of interviews, postal questionnaires or analyzing archival data.

4. *Accessibility of information.* Your topic should be in an area that you can have access to the necessary data for the successful completion of the research.

5. *Personal ability.* The subject and extent of the research should be within your intellectual and physical resource ability.

6. *Personal interest.* Last but not least, you should be interested in the subject of research. It is of no use if you do not like or enjoy the research subject.

It should be noted that when choosing research topics one should remember that results of the research should also have novelty features. The elements of scientific novelty are as follows:

- scientific generalization and systematization of the studied material;
- identification of causal relationships, influencing factors, essential or basic elements, functions, development;

categorical apparatus development;
typology (classification) of elements;
defining conceptual solutions and ways to solve problems;
establishing principles, factors, conditions, typical features;
developing models, mechanisms, concepts and applications;
preparing the methods.

At the stage of topic formulation scientific novelty can be defined only as the authors expectation of some results.

Step 2. Definition of the applied problem

Research is aimed at expanding the available knowledge and gaining a new one, to identification and study of the laws and regularities of the world. According to the purpose fundamental and applied types of research are distinguished.

Fundamental research refers to the development of new theories and new principles of research designed to deepen knowledge of the laws of nature and society; **applied** research aims to find practical ways to use scientific knowledge acquired as a result of fundamental research. Much of the economic research is applied in nature.

To properly formulate the goal of the applied research it is necessary to identify, within the chosen topic, an applied problem that will be the "center" of the research.

The problem is formulated on the basis of thorough review of domestic and foreign publications in this and related research areas.

An applied problem is a situation that arises in practice and is characterized by contradictions between the two states: existing and desirable.

For example, the situation in the company is crisis; a desirable state is effective activity of the enterprise. To solve the problem means to eliminate the gap between these two states, for example, implement an anti-crisis package of measures.

Example. As an example of applied research, consider the topic "Human Resource Management in a company in crisis". Within this topic a number of problems faced by business entities in their everyday practice will appear. One of the problems is associated with a contradiction between the needs of the company's management for its anti-crisis activities and personal interests of the staff. The cause of this problem lies in the fact that during the

anti-crisis activities staff reductions, delay in the payment of wages, lack of social guarantees, and other concerns of employees are observed.

So, in this example scientific research may be focused on the applied problem of inconsistency of anti-crises processes of the enterprise and personal interests of its staff.

Step 3. Identifying a scientific problem

While formulating the problem it is important to determine the status of scientific research in this area, during which the student must systematize and distinguish:

knowledge that has gained public recognition of scientific community and has been proven in practice;

questions that have not been sufficiently developed and require a scientific study (discussion);

outstanding questions formulated in the process of theoretical study which are proposed by practice or those that occurred during the selection of topics.

In the case when the applied problems are characterized by adequacy of scientific knowledge required to solve them, it is a **scientific task**. But if we have not enough knowledge to do this, it becomes a **scientific problem**.

Thus, a **scientific problem** is a task for which solutions must go beyond existing knowledge.

A continued example. If modern science methods already exist for the harmonization of processes of anti-crises activity and personal interests of the staff, all the managers need to do is read them and introduce them into practice. Otherwise the applied problem causes a science problem, whose essence is expressed in the absence of application of individual methods of approach to the company staff during the introduction of anti-crisis measures.

Step 4. Setting the purpose of scientific research

The purpose is the end result of the achievement it is directed at. It is adequately shown in the topic of the research, contained in the general anticipated results and scientific tasks.

The formulating of the objective can be obtained as denying the problem.

It is important to specify the purpose to find out which aspects of the problem have already been developed by other researchers, and identify the

sides which nobody has touched upon. Logical relationship between objectives, problems and research topics is shown in Fig. 2.

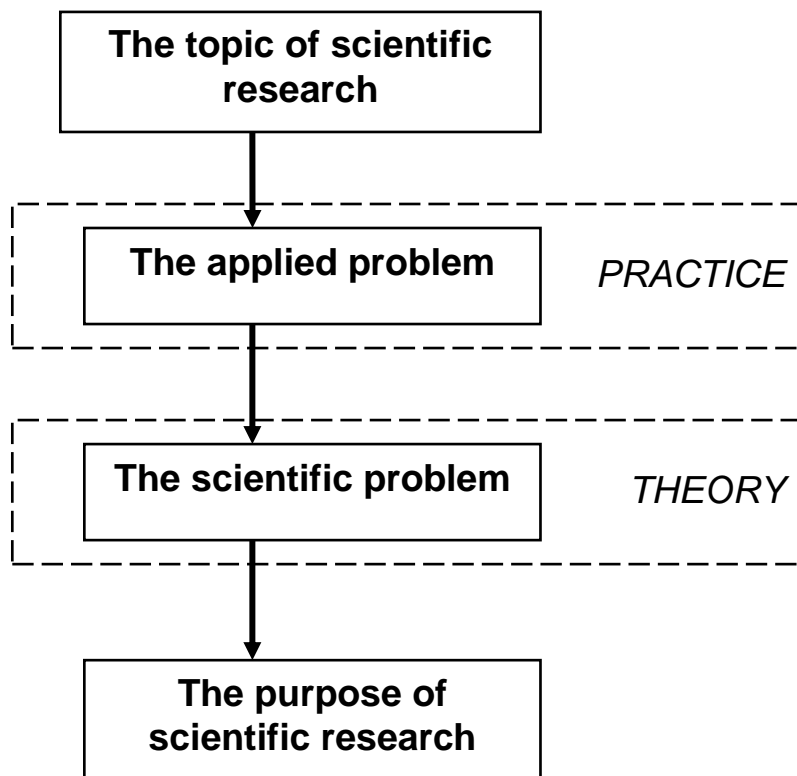


Fig. 2. **Logical relationship between the topic, the problems and the purpose of scientific research**

The objective of scientific research is one of the most important stages of research.

A continued example. The objective of the research, which is considered by us as an example, can be formulated in a particular form of denial of scientific problems. In this case, the purpose is to develop a technique for applying an individual approach to the company staff during the introduction of anti-crisis measures.

Step 5. Formulation of research tasks

To achieve the purpose, a relatively independent list of scientific tasks is formulated, each task concerning a specific aspect of the scientific topic and goal.

Usually scientific tasks are given as a list: analyze ..., develop ..., summarize ..., prove ..., show ..., describe ..., identify ..., find ..., define the ... etc. Tasks cannot be formulated as "learning", "acquaintance", "research",

etc., so as not to indicate the result of a scientific development and individual processes.

The purpose is achieved by solving certain scientific problems. The purpose and tasks of the research cannot be identified separately from the subject and object.

The object of research is a process or phenomenon that causes the problem or situation and requires more detailed knowledge.

The subject stands for a phenomenon or a process that is located within the facility and considered as an element of the research object. In other words, **the subject** is the most important properties of an object, some of its aspects, segments or linkages that should be considered. The object and subject of the scientific process as a category relate to each other as total and partial (isolated) (Table 3).

Table 3

The object and subject of scientific research

Object	Subject
Company	Profitability of a company
Tourism business	Methods of organizing tours
Staff of an enterprise	Methods of motivation

A continued example. The object of the study is considered to be anti-crisis activities, and the subject of the research is an individual approach to personnel management within the anti-crises activity.

For proper understanding of the problems to be solved and making a precise list of tasks it is necessary to outline the subject area of the research and reveal its structure (Fig. 3).

That is, the student can vary the width of the field of study, depending on the resources it has and the challenges ahead.

The subject area of the research is a collection of all the objects and phenomena that should be taken into account in the research to correctly understand the problem and solve the task.

To structure the subject area it is necessary to identify the limits of the substantive elements of the region and relations between the elements. The basic form of the structure is construction of a structural model.

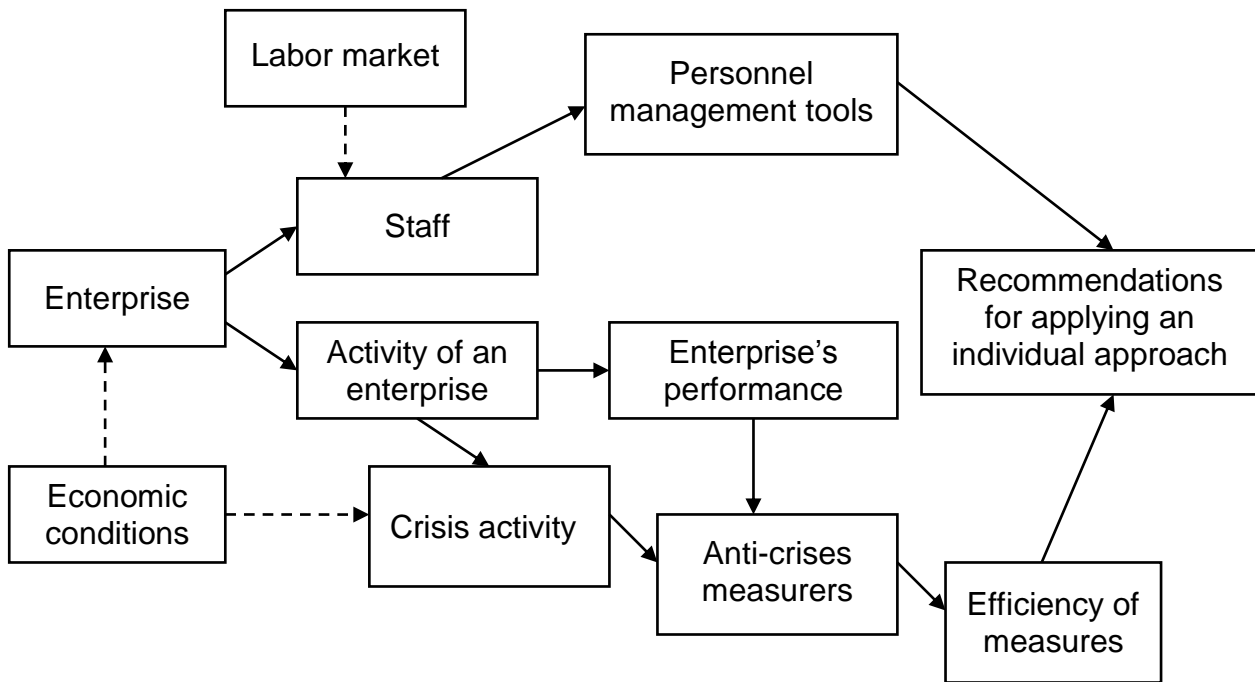


Fig 3. The structure of the subject area of the research "Human Resource Management in a Company in Crisis"

Step 6. Justification of the practical value

Practical value is an important element of justification of the scientific research topic, which confirms the importance of theoretical and methodological developments labels for use in the process of human life (in a precise or different areas).

To study the possible practical significance of research you should specify the persons or organizations that require the application of its results.

A chart of interested persons (subsidiaries and dependent) may give visual images of such persons (Fig. 4).

For subsidiaries and dependent companies you first of all have to draw a circle in the center of a sheet of paper which symbolizes the expected results of scientific research. Then at some distance from the chart center circles are placed that symbolize businesses and organizations interested in implementing research results. At that distance from the center of each circle the chart should match the degree of interest of the organization: the more the interest the less the distance. Thus, near the center major research customers will be located. The circles are connected with the center of the chart and signed. The built chart is discussed with the colleagues and supplemented. The list of scientific research tasks is adjusted based on the results of the discussion.

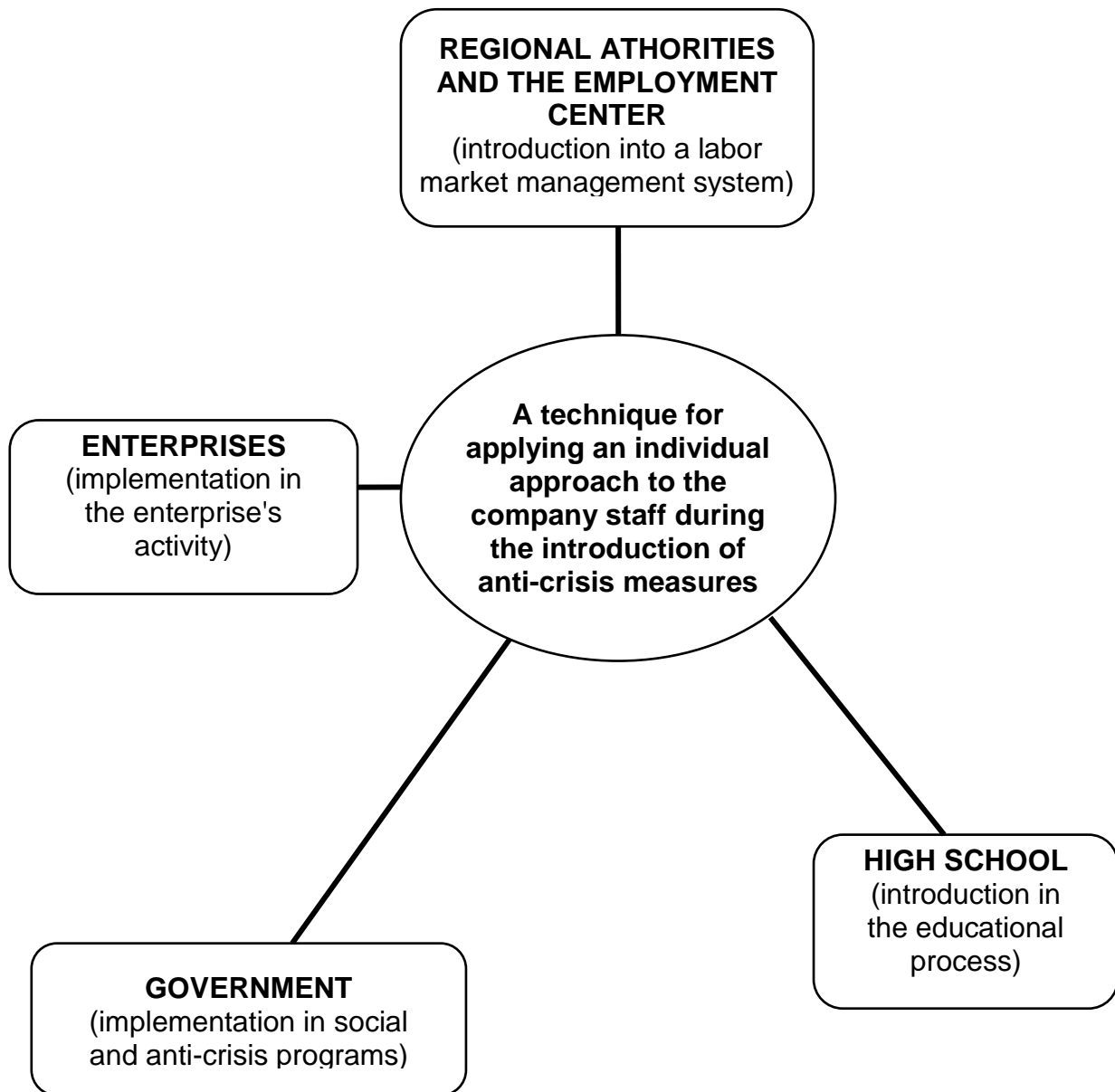


Fig. 4. The chart of people interested in the research on "Human Resource Management in a Company in Crisis"

Also, when assessing the significance of scientific research various types of impact of its implementation are included: economic, financial, scientific, technical, social, ecological, institutional, etc.

Independent tasks

Choose a theme for scientific research. Based on the selected theme, perform the following tasks:

1. According to literature sources and Internet sites identify the applied and scientific problems of the scientific research.
2. Prove the relevance of the topic.

3. Identify the purpose of the research. Build an algorithm of the goal formulation.
4. Formulate the tasks of the research. Identify its object and subject.
5. Perform structuring and analysis of the subject area. The results of the analysis of the subject and purpose of the study can be clarified.
6. To prove the practical significance of the research, indicate the possible interested organizations and individuals. Construct a chart of the interested people.
7. Make a report, following the results of the research.

Practical task to Theme 2

Operations with concepts

The purpose of training is learning the essence of concepts and review basic operations with them.

To achieve this goal the following tasks should be solved:

to learn how to formulate a definition;

to learn how to shape classification;

to acquire skills in identifying essential attributes of the objects studied.

Keywords: concepts, essential features, definition, classification.

Training material

Using concepts is an integral part of the research process, as the level of scientific theory, the depth of its findings, the ability to adequately reflect the underlying processes, patterns largely depends on the maturity, intensity and perfection of scientific concepts, which it operates.

To reveal the essence of the phenomenon under research it is necessary, above all, to reveal its essential features and fix knowledge in the form of a definition. Further examination of options of the phenomena studied, is impossible without the operation of classification. Precise definitions and classifications are necessary to prevent ambiguity both on the stage of testing the results of the scientific research and on the stage of their implementation.

Let's consider the relationship between the terms "concept", "essential features" and "definition".

Essential features are signs, each of which is *necessary* and together *sufficient* to distinguish the data items from the others. An attribute is necessary if, when losing it, the subject ceases to be itself.

An example of concept formulation. Policy is a verbal, written or implied overall guide, setting up boundaries that supply the general limits and directions in which a managerial action will take place.

A concept is a form of thinking that provides the essence of learning phenomena, processes, summarizing their characteristics. The concept is created as a result of two operations: the selection of common features in a number of similar objects and abstracting from other features.

The content of concepts is a set of essential features referred to in the notion.

A definition is a logical operation that opens the meaning of the notion.

The formula of an explicit definition:

$$A = B + C \quad (1)$$

where A is the concept that is defined;

B is the concept, more general in accordance to A (genus);

C is the features that distinguish A among all the subjects B (species difference);

general " $B + C$ " is the notion that is being defined.

To correctly understand and formulate a definition you should be able to set the denotation, identify generic and specific concepts, and conduct operations of restriction and generalization of concepts.

Denotation is defined by a set of objects to which it applies. If the denotation of one concept includes another one, the greater denotation is called a genus, and the narrower one is a species. The relationship between denotation and its content is formulated as a logical law of "inverse relationship": the increase of the term decreases its volume, and the increasing denotation decreases its content.

A continued example. "Policy" is A (the concept that is defined); "overall guide" is B (genus); "verbal, written or implied" and "setting up boundaries that supply the general limits and directions in which a managerial action will take place" is C (species).

Restriction is a logical operation with the concept, through which a transition from the concept with a wider scope to the concept of a narrow scope is effected by means of complication (enrichment) of the content.

Generalization is a logical operation which implies a transition from the notion of a narrow scope to the concept with a wider scope by reducing (depleting) the content.

To determine if the function is performed correctly, i.e. the notion under consideration is disclosed the following guidelines should be kept to:

1. The rule of commensurability of the concept that is defined with the concept, through which it is defined: they must cover the same set of subjects.

An example of an error when a definition is too broad: "A crisis is a sudden change at an enterprise". In this definition a sharp transition to the effective activity of an enterprise also falls under the concept of crisis.

An example of an error when a definition is too narrow: "A crisis is a sharp deterioration in the performance of domestic enterprises". This definition applies to purely economic crisis of Ukrainian enterprises.

2. Prohibition of false circles: you cannot define the concept by itself.

An example of an error: "A crisis is a crisis".

3. Definitions must be clear and show signs of essential features.

An example of an error: "A crisis is the end of the world".

Working with concepts in the framework of research lies not only in formulating definitions, but also in building classifications.

Classification is a partial case of division. Division is the grouping of those items that are implied in the concept of a derivative. The resulting groups are called members of this division, and the grounds on which the division is performed is called a classification basis. Classification is generally understood as branched division.

Requirements to classifications:

1. *Division must be exhaustive, i.e. classification should cover the entire set of objects without remainder.*

An example of violation of this requirement: "People are divided into those with primary education, those with secondary education and those with higher education".

2. *One object must refer only to one class (group).*

An example of violation of this requirement: "The numbers are divided into multiples of two, three multiples, multiples of five and simple (which are divided only by themselves and one)".

3. *Division shall be carried out on one basis, that is the sign selected first should not change or be enhanced.*

An example of violation of this requirement: "People are divided into men, women, women of the southern hemisphere and northern hemisphere".

"The type of tourism depends on the reason for travel and includes domestic, international and outbound tourism".

Independent tasks

1. The task on "Definitions". Find out if the following definition is formulated properly. If not, what rules are violated?

1. Taxes are mandatory contributions paid to all the individuals and entities in the state budget and extra budgetary funds in the amount specified by law and on time.

2. Taxes are contributions.

3. Commodity products are products that are manufactured in the company.

4. Quantity is a characteristic of an object with its quantitative aspect.

5. A plan is a set of instructions.

6. A dreamer is a man who builds castles in the air, and a businessman is someone who is able to sell them.

7. Personnel management is part of management.

8. Revenue is a characteristic of the results of functioning of an enterprise.

2. The task on "Essential features". Find out which of these features make the content of the concepts relevant and which do not and why (are not sufficient or necessary).

1. Taxes are:

a) contributions paid into the budget and extra budgetary funds;

b) the compulsory contributions paid by all the individuals and entities in the state budget and extra budgetary funds in the amount specified by law and on time.

2. Microeconomic research is:

a) the study of the economic activities of private entrepreneurs;

b) economic research at symbolically economic units.

3. Managers are individuals who make decisions about the use of the organization's resources.

4. The goal of a company is the final result that a firm wishes to achieve.

5. Investing is the acquisition of securities.

6. A monopoly is a large enterprise.

7. A strategic plan is the organization's long-term vision.

3. The task on "Restriction of concepts". Can you believe that this is restriction: the transition from the concepts given on the left to the concepts listed on the right in the following pairs? Justify each statement. If not, supply a correct version of restriction:

1. a bookkeeping department – a company;
2. a strategy – a marketing strategy;
3. an instruction – a rule;
4. a plant – a production site;
5. cooperation – international cooperation;
6. a forecast – a plan;
7. an organization – management of an organization;
8. an enterprise – a shop;
9. efficiency – the degree of achieving a goal.

4. The task on "Generalization of concepts". Are the concepts in the following examples generalized? Justify each statement. If not, supply a correct version of generalization:

1. a river – a water body;
2. a short-term forecast – a long-term forecast;
3. a city street – a city;
4. a sales manager – an economist;
5. a limited liability company – a legal entity;
6. the law on individual labor activity – individual labor activity;
7. individual performance – an overall index;
8. a sales contract – a transaction.

5. The task on "Classification". Determine whether these classifications are correct. If not, what requirements do they violate?

1. Fixed assets are divided into:
basic funds;
major non-manufacturing assets;
objects of cultural and community uses;
a dining room.
2. Expenses that create production costs are divided into:
material costs;
labor costs;
social charges;
depreciation of fixed assets.
3. Depending on the purpose, travel routes are divided into:
cognitive;
recreational;

sports;
religious.

4. Employees of an industrial enterprise are divided into the following groups:

workers;
men-servants;
female employees.

5. Vacations are:
those that are paid;
those that are not paid;
training.

6. Years are divided into:
days;
months.

7. Operation of commercial organizations is differentiated into:
trade;
advertising;
financial.

8. Classification of decision-making styles:
authoritarian;
democratic;
ineffective.

9. Resident Oriented Products (ROPs) include:
health services;
public parks;
retail shops;
banks for foreign currency exchange;
ATMs;
petrol pumps;
postal services;
local transport.

6. The task on "Morphological analysis". Develop three key concepts in the subject area of a scientific research. Find their definitions from different sources of literature. Select the correct genus and species concepts for each concept. Present the results of the research in a table of morphological analysis. Underline the essential features (species). An example is provided in Table 4.

Morphological analysis of the term "Planning"

Definition	Key words (genus)	Source
1. A business plan is a <u>formal</u> statement of a set of business goals, the reasons they are believed attainable, and the plan <u>for</u> reaching those goals	Statement	Pinson L. Anatomy of a Business Plan: A Step-by-Step Guide to Building a Business and Securing Your Company's Future / L. Pinson. – Chicago : Dearborn Trade, 2004. – 128 p.
2. A business plan is a document that <u>summarizes the operational and financial objectives</u> of a business and <u>contains the detailed plans and budgets</u> showing how the objectives are to be realized	Document	Business Plan Input and Impact Indicators [Electronic resource]. – Access mode : http://www.fco.gov.uk/en/publications-and-documents/publications1/annual-reports/business-plan/

7. Task on "Building classification". Choose two concepts from the previous task. Form a classification for them.

The results of tasks 6 and 7 are to be drawn up in the form of a report.

Practical task to Theme 3

The analysis of scientific publications

The purpose of training is an analysis of scientific publications on a selected scientific research.

To achieve this goal it is necessary to solve the following *tasks*:

to acquire skills in analyzing scientific texts;

to learn how to identify the scientific articles relevant to the structural elements of the research.

Keywords: a scientific article, the structuring of scientific articles.

An **article** is a description of scientific research: it involves the results, accepted hypotheses and axioms, methods and models. In order to properly understand the content, a student should be able to correctly analyze and structure the article.

To complete the structure of a scientific article is to find the meaning in the text description of the key elements of the relevant research in their logical relationship. In other words, it means "to decipher" the article. Structuring scientific text allows the reader to reproduce the picture of the main points of the research work, to properly assess the novelty and importance of the results to effectively use them in their careers.

In the process of structuring scientific articles a student should identify the following key items of scientific research:

1. An applied problem with justification of its relevance.
2. A scientific problem.
3. Research objects.
4. The subject of the scientific research.
5. The objective of the scientific research.
6. Hypothesis.
7. Scientific facts on which the hypothesis is formulated.
8. Methods used in the research.
9. The obtained conclusions.
10. New concepts.
11. Scientific results.

Some of these elements can be described in the text clearly, others – implicitly. In the second case it is necessary to formulate the relevant elements of a scientific research independently.

After identifying the structural elements of the text students should follow these steps:

1. Make an abstract of the article.
2. Based on the bibliography and the text of the article supplement and clarify the bibliography on the subject of the scientific research.
3. Note the main provisions of the article that provide value to the research.

Independent tasks

1. Find a scientific article on the topic selected for scientific research and identify the structural elements of the publication.
2. Give a scheme of the article that reflects the relationship of individual parts of the text.

Practical task to Theme 4

Methods of learning, processing and compilation of references

The purpose of training is learning the technique of studying, processing of the literature and compiling a bibliography.

To achieve this goal it is necessary to solve the following tasks:

to learn how to make a compendium, an abstracts, an annotation of scientific papers (articles, theses, monographs);

to acquire the skills in compiling a bibliography of publications on the subjects investigated.

Keywords: abstract, annotation, bibliography.

Training material

The literature review is an essential stage in conducting a research project. It amounts on average, to between 20 and 25 per cent of a scientific work content, although certain research subjects may require a literature review amounting up to 50 per cent of the content. The literature review involves reading and appraising what other people have written about your subject area. It can be both descriptive and analytical. It is descriptive in that it describes the work of previous writers and it is analytical in that it critically analyses the contribution of others with the view of identifying similarities and contradictions made by previous writers.

There are five main activities involved in undertaking a literature review:

1. Knowing the sources of information.
2. Understanding how the library works.
3. Collecting existing knowledge on the subject, reading and note-taking.
4. Systematically organizing the literature.
5. Appraising and writing up a literature review.

In economic studies important sources of information are science literature, data of the official state statistics and reporting data of companies. Collection of material must be accompanied by its critique.

For any scientific research work literature is very important. Its study should begin with the basic operations and move from the general to the particular, from the basic to the more specific provisions. With regard to the chronological order of publications, firstly it is necessary to study recent

publications and then those more distant in time. To quickly obtain the necessary information from the literature, it is advisable to study it by stages.

Knowing the sources of information. Starting the literature review involves the identification of appropriate literature. Generally speaking, there are three types of literature sources available for a researcher to look at. These are primary sources, secondary sources and reference guides.

Primary literature is the most accurate source of information as it publishes original research. The following publications fall within these primary sources: Academic research journals (referred), referred conferences, dissertations/theses and reports/occasional papers.

Secondary literature sources are those that cite from primary sources such as textbooks, and newspaper articles.

Reference guides are very useful sources of information for short and quick answers to basic questions. The function of the reference guides is to introduce the basic information about a particular subject area. Sources that fall within these guides are dictionaries, glossaries, encyclopedias and handbooks.

Understanding how the library works. Having identified the sources of information, the next step that you need to take is to know how to find the material. It is absolutely vital that a researcher understand the library and how to use its sources most effectively. There are three important points that you need to bear in mind while conducting a literature research:

1. Find the most relevant published materials quickly.
2. Avoid getting "bogged down".
3. Get into the habit of recording information derived from your reading so that it can be easily found and understood weeks, months or years later.

Therefore, you may have to spend a few days getting to know the services offered by your library, what materials it holds and where, as well as the coding or shelving system it uses (usually the Dewey decimal system). Each library should contain the following:

- 1) a library catalogue;
- 2) abstracts/indexes;
- 3) citation indexes;
- 4) microfiche/microfilm;
- 5) CD-ROM, on-line database, Internet/World Wide Web, Telnet.

Note-taking. It is important to take notes of your literature as it is the best means to recapitulate what you have reviewed. When taking notes, you should focus on the main issues addressed and the main arguments put forward.

Note-taking forms the basis for the construction of a literature review framework and provides the best way of maximizing the extraction of information in the initial reading stage. Note-taking provides a researcher with a focused framework and ensures that unnecessary detail is not incorporated into the review. To enable a researcher to get the most out of the literature, it might be useful to address each piece of literature with the following questions:

1. What do I know already?
2. What am I looking for in this source; what do I think I need?
3. What is useful or different in this source, given my existing knowledge and interest?

It is also useful to consider a form for taking summary notes since its aim is to enable a researcher to put these notes together in a meaningful way (Fig. 5).

Fig. 5 is a sample form on which to take notes and ideally should not be more than one page in length and at the most two pages. Use one form for each piece of literature.

<p>Reference details</p> <p>Author(s):</p> <p>Year of publication:</p> <p>Title of the article or chapter in the edited book:</p> <p>Volume and issue number (journals):</p> <p>Place of publication (books):</p> <p>Publisher (books):</p> <p>Page numbers (journal and edited book article):</p> <p>Source (classification number and library location):</p>
<p>1. Main issues</p>
<p>2. Main arguments</p>
<p>3. Research methodology (if applicable)</p>
<p>4. Main conclusions</p>

Fig. 5. A sample summary note-taking form

Organizing the literature review. Note-taking is highly important in building a good research file. The summary and abstract for each article become important for quickly sifting out the irrelevant from the relevant research. For those that appear relevant, you then proceed to read the entire text. Therefore, it is absolutely essential to start from day one of your research to maintain a literature file to store the material that you collect. If it is a four months' dissertation, one large file will probably be enough to store all the information you gather.

Abstracting is a summary of the original document (or portion thereof) with basic actual data and conclusions. The result is an abstract, which contains: the topic, the subject, the object of the research, the objectives, the research methods, the results, the conclusions and the applied scope.

An abstract is not just an incised version of the original. Each abstract has its own peculiarities: style and presentation logic, composition, and language. The nature of the abstract depends on whom and for what purpose abstracting is done.

A peculiar kind of abstract word processing is annotation. It also describes the contents of the publication, but usually shorter than in the abstract.

An **annotation** is a brief description of a publication in terms of the content, the purpose, the shape and other features.

The main difference between the annotation and the abstract is that in the abstract the facts and the main provisions are outlined in the same language, while the annotation always expresses the author's attitude to the work which is treated, it points out the goal, the objectives and the practical value of the work.

Critical appraisal of a literature review. A *critical appraisal* is analytical in nature. It critically examines the contribution of other people's work with a view to identifying the following:

- 1) similarities in the statements made by previous writers;
- 2) common issue(s) raised by previous writers;
- 3) differences or contradiction of statements made by previous writers;
- 4) criticisms made by previous writers.

A researcher has to write an alternative abstract after reading the paper (Table 5).

**Example parameters to discuss and explore
when critiquing the work of others**

Why have you chosen this paper / how does it impact your project?	Does it refer to the relevant, recent literature?
Outline briefly what the paper is about (three or four sentences).	Are there error bars/standard errors shown? How wide are they?
Did they use the most appropriate methods?	Are the controls shown? Are they convincing?
How were the methods validated?	What conclusions do the authors draw?
What controls did they run?	Do you agree with them?
How many times was each experiment repeated?	What journal is the article published in?
Are the results convincing?	What ideas can you expand upon or make use of in your own work?

One more important aspect of the work with the literary sources is compiling a bibliography on the topic of the scientific research.

A **bibliography** or a **list of references** is a list of different sources of information on the topic investigated indicating the following data: the surname and initials of the author, the source title, the place of the publication, the publisher, the year of the publication, the volume of the source in pages.

Sources in the list of references are given in alphabetical order (in alphabetical order by first author's surname or headers). First come the sources in Ukrainian and Russian, then foreign-language sources are provided. Numbering is sequential.

A sample bibliography by types of sources is given in Table 6.

A sample design of bibliography by types

Source type	Patterns
1	2
Legislation and regulations	<p>1. Господарський Кодекс України від 16.01.2003 р. № 436-IV // Відомості Верховної Ради України. – 2003. – № 18, № 19 – 20, № 21 – 22. – С. 144.</p> <p>2. Закон України "Про Державну програму економічного і соціального розвитку України на 2010 рік" від 20.05.2010 р. № 2278-17 // Відомості Верховної Ради України. – 2010. – № 33. – С. 470.</p>
Official standards	<p>3. Система управління якістю. Вимоги: ДСТУ ISO 9001-2001. – Чинний від 27.06.2001 р. – К. : Держстандарт України, 2001. – 30 с.</p>
Legislation and regulations from the internet	<p>4. Закон України "Про Державну програму економічного і соціального розвитку України на 2010 рік" від 20.05.2010 р. № 2278-17 [Електронний ресурс] // Офіційний сайт Верховної Ради України. – Режим доступу : http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=2278-17.</p>
Monographs, textbooks, dictionaries (one author)	<p>5. Barnett T. Corporate Social Responsibility: Encyclopedia of Management / T. Barnett. – London : Kogan Page, 2006. – 358 p.</p> <p>6. Conaty B. The talent masters: why smart leaders put people before numbers / B. Conaty. – New York : Crown Publishing Group, 2011. – 457 p.</p>
Monographs, textbooks, dictionaries (2 or 3 authors)	<p>7. Stoner J. A. Management / J. A. Stoner, R. E. Freeman. – New Jersey : Prentice Hall, 1989. – 723 p.</p> <p>8. Lepeyko T. Basics of the information economy : textbook / T. Lepeyko, O. Mazorenko. – Kh. : KHNUE, 2013. – 141 p.</p>
Monographs, textbooks, dictionaries (4 authors)	<p>9. IT in Business. A manager's casebook / D. Targett, D. J. Grimshaw, P. Powell, J. Green et al. – Oxford : Butterworth-Heinemann, 1999. – 318 p.</p>
Monographs, textbooks, dictionaries (more than 4 authors)	<p>10. Maximizing the impact of executive coaching: behavioral change, organizational outcomes, and return on investment / J. McGovern, M. Linderman, M. Vergara, et al. – Manchester : The Manchester Review, 2008 – 689 p.</p>

Table 6 (the end)

1	2
Papers in periodicals (newspapers, magazines)	<p>11. Ostapenko I. Internal training center as an alternative way of staff development / I. Ostapenko // Management of development. – 2013. – No. 22 (162). – P. 161–163.</p> <p>12. Drnevich P. Information technology and strategy: Two camps, four perspectives, one elusive goal / P. Drnevich, D. McIntyre // International Journal of Strategic Information Technology and Applications. – 2010. – No. 1 (2). – P. 1–18.</p>
Papers in the Internet	<p>13. Hanifan L. J. The Rural School Community Centre. Annals of the American [Electronic resource] / L. J. Hanifan // Academy of Political and Social Sciences. – 1916. – No. 67. – Access mode : http://www.jstor.org.</p> <p>14. Small Businesses Need Innovation / New Company May Have Their Solution [Electronic resource]. – Access mode : http://www.sfgate.com/cgi-bin/article.cgi?f=/g/a/2010/10/25/prwebprweb4693214.DTL.</p>
Proceedings of conferences	<p>15. Thomas A. Heberlein. Attitudes, norms and the art of visitor management / T. A. Heberlein : proceedings of the 6th International Conference on Monitoring and Management of Visitors in Recreational and Protected Areas, Stockholm, Sweden, August 21 – 24, 2012. – Stockholm : FFR, 2012. – P. 17–19.</p> <p>16. How Students Learn using MOOCs: An Eye-tracking Insight / K. Sharma, P. Jermann, P. Dillenbourg : proceedings of the European MOOC Stakeholder Summit 2014, Germany, Hamburg, April 12 – 15, 2014. – Humburg : P.A.U. Education. – P. 147–155.</p>
Abstracts of dissertations	<p>17. Barabas D. O. Management of competitive advantages of the company : abstract of dis... PhD in Economics : 08.06.01 / D. O. Barabas. – K., 2003. – 18 p.</p>
Dissertations	<p>18. Barum O. M. Decision-making: process approach : dis ... PhD in Economics : 08.06.01 / O. M. Barum. – M., 2004. – 241 p.</p>

Independent tasks

1. Choose five different publications (textbooks, monographs, periodicals, conference proceedings, etc.) on the topic of your scientific research and fill the note-taking form for each one.
2. Write an annotation of the article on the research topic.
3. Make a bibliography of publications on the topic of your scientific research (the bibliography should contain minimum 10 sources).

Practical task to Theme 5 Models and modeling in scientific research

The purpose of training is to learn the basics of modeling in scientific research, acquire skills in charting causal relationships and mathematical simulation model.

Keywords: model, design, diagram of causal relationships, mathematical model, figurative and symbolic model, simulations.

Training material

A model is the most basic element of the scientific method. Everything done in science is done with models. A model is any simplification, substitute or stand-in for what you are actually studying or trying to predict. Models are used because they are convenient substitutes, the way that a recipe is a convenient aid in cooking.

Models are very common. The ingredients list on a bottle of ketchup is a model of its contents, and margarine is a model of butter. A box score from a baseball game is a model of the actual event. A trial over an automobile accident is a model of the actual accident. A history exam is a model designed to test your knowledge of history.

Models are of central importance in many scientific contexts. Scientific models may or may not be physical entities, but scientists build them for the same variety of reasons: to replicate systems in the real world through simplification, to perform an experiment that cannot be done in the real world,

or to assemble several known ideas into a coherent whole to build and test hypotheses.

In science, **a model** is a representation of an idea, an object or even a process or a system that is used to describe and explain phenomena that cannot be experienced directly.

Modeling is the process by which scientists represent ideas about the natural world to each other, and then collaboratively make changes to these representations over time in response to new evidence and understandings.

Models appear as drawings on whiteboards in laboratory hallways, as diagrams in research articles, and even as sketches on napkins. Wherever they appear, they are, or will be, an object that reflects changes in thinking about some set of ideas. Models don't just reflect reasoning, they also stimulate new ideas.

One can list specific cases in which a model is needed (both in scientific research and production activities):

a) when the original object is a complex system, the direct study of which is difficult, impossible or uneconomical;

b) when experimenting with an original object could have a devastating influence on it or other objects associated with it;

c) when it is necessary to predict the possible state or behavior of the object in the future;

d) a need to develop options and choose optimal solutions associated with the functioning of the original object;

e) when the original object does not exist in the material form, but already in the design phase is required to provide information about this property, evaluate the effectiveness of selected methods and tools for their development;

f) when in practice there is a need to simplify the provision of information about the original to support the information of people who work with them;

g) when you learn to use a simulated system, in games, etc.

Models are used at every turn in a scientific study. Samples are models. Ideas are models. Methods are models. Every attempt at a scientific study involves countless models, many of them small and of interest only to a small group of other scientists.

Trying to enumerate all the models found in business, industry, and society is simply impossible. Models pervade all white collar jobs. Table 7 shows models from fields as diverse as advertising, architecture, finance and manufacturing. In this table we have chosen to give a single model from each of a number of fields. However, we could have just as easily picked one job, say retail sales, and listed 150 models associated with it.

Table 7

Models in business and government

Field	Common type of model
1	2
Advertising	Response to an advertisement tested in a single city is a model of the national response to the ad
Architecture	The plans for a new building are a model of the actual building
Business	Past dealings with a client are a model of the trustworthiness and promptness you can expect from her/him in the next deal
Education	A student's performance on a history exam is a model of everything learned about history since the last exam
Finance	The rating Morningstar gives a bond fund is a model of the fund's future performance
Franchising	A company uses its existing stores to model the likely success of stores it is considering to build
Manufacturing	Profit projections are based on a model of material and labor costs as well as sales price
Retail sales	The December sales in 1995-2003 model the December sales expected in the coming year

Models are important outside of science because success in any professional endeavor involves accurately predicting or manipulating the future, and we need models to do this.

Different kinds of models are used for different purposes. Table 8 lists major types that will be used in this class. Not all models fit neatly into these categories.

Table 8

Classes of models

Class	Familiar types	Examples/comments
Abstract	Predictions, theories, hypotheses, many mathematical and computer models	Newton's laws in physics, plans, recipes, statements such as "taking anabolic steroids increases one's strength," or "smoking causes lung cancer"
Subject-mathematical	Computer (machine) model, seminatural model, model-analogue	The main thing here is to reproduce the regularities of processes. Thus, the subject-mathematical models have such characteristic features: they are embodied in the object (material); processes in such models are different in nature from the processes in the object – the original; processes in the model and the object-the original are governed by the same laws. Practically, this means that the processes in the model and the original object can be described by the same mathematical relationships
Physical	Organisms and their properties, replicas, structures, demonstrations	A globe is a physical model of the earth, each of us is a model for other humans, and the physical structures used in chemistry class are models of molecules
Sampling	Random choice, personal preference	The sampling model refers to the way that subjects are chosen for a study and divided up among the different groups
Symbolic	Descriptive models (algorithms, programs, text-graphics descriptions), schematic models (various flow-charts, diagrams), graphic analytical models (built using toolkits different networks, graphs), logical-mathematical model	These models include drawings, graphs, charts, tables. An important element of this model is symbol numbers

A model is in some way a substitute for what is being studied. They are widely used, and there are many types of them.

Independent tasks

1 – 3. Indicate which kind of model best fits the example provided. Each question has at least one correct answer, and some questions may have more than one correct answer.

1. Model: Monthly dairy products demand forecast in a grocery store.

- A) A physical model.
- B) An abstract model.
- C) A sampling model.
- D) A symbolic model.
- E) A subject-mathematical model.

2. Model: Silver 2014 BMW X6.

- A) A physical model.
- B) An abstract model.
- C) A sampling model.
- D) A symbolic model.
- E) A subject-mathematical model.

3. Model: 10 potatoes that you pick out of a bin in a supermarket. After coming home you discover that 2 of these potatoes are rotten.

- A) A physical model.
- B) An abstract model.
- C) A sampling model.
- D) A symbolic model.
- E) A subject-mathematical model.

4. Your job at an advertising agency is to evaluate some data on the effectiveness of an advertising campaign for the Better Burger fast food hamburger chain. These data were obtained by placing identical full page Better Burger advertisements in the Vogue and the Newsweek. Each ad had a coupon attached, redeemable for a free hamburger at any Better Burger location. (The coupons placed in the Vogue and the Newsweek could be distinguished with a very small mark, so you could tell which magazine a given coupon came from.) To analyze these data, you determine what percent of the Vogue coupons were returned, and what percent of the

Newsweek coupons were returned. Because a higher percent of the Vogue coupons were returned for free hamburgers, you recommend that all future advertisement be placed in the Vogue. You justify this recommendation by stating that the data suggest that an ad placed in 10,000 copies of the Vogue will produce a greater number of future hamburger sales than an ad placed in 10,000 copies of the Newsweek. The conclusion of this study involves the use of the models listed below. For the model, choose one answer among the seven following options that best explains what it represents. In deciding between possible answers, use the above description of how the model was used as your guide.

Model: The people who returned coupons from the Vogue.

A) The people who returned Newsweek coupons.

B) Everyone who ate at Better Burger while these advertisements were running in the Vogue and the Newsweek.

C) Everyone who purchased a copy of the Vogue while the advertisement was running.

D) Everyone who purchased a copy of the Newsweek while the advertisement was running.

E) Everyone who would purchase a Better Burger hamburger in response to a future advertisement you plan to run in the Vogue.

F) Everyone who would purchase a Better Burger hamburger in response to a future advertisement you plan to run in the Newsweek.

G) This model was not used in analyzing these data.

5, 6. After graduation, you are hired by Jim's (a local restaurant chain), to manage their restaurant on the corner of Ben White and I-35. You want to please future customers, so you put postcards (pre-stamped) out on the tables. The postcards have several questions, including "Were the restrooms clean?", and "Would you like us to serve a wider selection of salads?" After 2 months, only 53 postcards have been returned to you, even though you know that the restaurant served 20,546 people during this 2 month period. 52 of those responding thought the restrooms were clean, and 1 didn't. And 34 of those responding thought that Jim's should not serve a wider variety of salads, and 19 thought Jim's should. Based on these responses, you decide that to satisfy the customers who will be coming to the restaurant, it is not necessary to make any changes in either the restrooms, or in the salads you serve. The above study involves the use of the two models listed below. For each model, choose one answer among the eight following options that best

explains what it represents. In deciding between possible answers, use the above description of how the model was used as your guide.

5. Model: The 52 people who responded.

6. Model: The 20,546 customers that Jim's served in the last two months.

A) All the customers that were served in the last two months.

B) All future customers.

C) All former customers.

D) The percent of customers during the last two months that responded to a survey.

E) The percent of customers during the last two months who thought the bathroom was clean.

F) The percent of customers during the last two months who thought that Jim's should serve a wider selection of salads.

G) The percent of future customers who would respond to a postcard survey.

H) This is not a model.

7. Identify the field, the common types and classes of models according to the topic of your scientific research. Give at least 5 different models.

Recommended literature

Main

1. Ашеро́в А. Т. Подготовка, экспертиза и защита диссертаций : учеб. пособ. / А. Т. Ашеро́в. – Х. : Изд. УИПА, 2002. – 136 с.

2. Глосарій з навчальної дисципліни "Основи наукових досліджень" для студентів усіх спеціальностей денної форми навчання [Текст] / укл. О. А. Єрмоленко ; Харківський національний економічний університет. – Х. : ХНЕУ, 2010. – 23 с.

3. Методичні рекомендації до виконання практичних завдань з навчальної дисципліни "Основи наукових досліджень" для студентів спеціалізації "Менеджмент організацій" усіх форм навчання / укл. О. І. Пушкар, Т. І. Лепейко, О. М. Миронова. – Х. : Вид. ХНЕУ, 2008. – 44 с.

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Харківський національний економічний університет. – Х. : ХНЕУ, 2013. – 31 с.

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7. Пушкар А. И. Основы научных исследований и организация научно-исследовательской деятельности : учеб. пособ. / А. И. Пушкар, Л. В. Потрашкова. – Х. : Изд. ИНЖЕК, 2006. – 289 с.

8. Эхл Ю. Практическое руководство для всех, кто пишет дипломные, курсовые, контрольные, доклады, рефераты, диссертации: успех без лишних проблем / Ю. Эхл. – М. : Metallurgia, 1997. – 243 с.

9. Syllabus of the educational discipline "Basis of scientific research" for students of direction "Management" for all forms of study / compiled by O. Myronova. – Kh. : Publishing House of KhNUE, 2012. – 28 p.

Ancillary

10. Basten G. Introduction to Scientific research projects / G. Basten. – Copenhagen : Ventus Publishing, 2010. – 51 p.

11. European Textbook on Ethics in Research / European Commission. – Luxembourg : Publications Office of the European Union, 2010. – 212 p.

12. Gauch Hugh G. Scientific Method in Practice / Hugh G. Gauch. – Cambridge : University Press, 2002. – 435 p.

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15. Maxwell N. The Comprehensibility of the Universe: A New Conception of Science / N. Maxwell. – Oxford : Clarendon Press, 1998. – 300 p.

16. Naoum S. G. Dissertation research and writing for construction students / S. G. Naoum. – Burlington : Elsevier Ltd., 2007. – 224 p.

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18. Shavelson Richard J. Scientific Research in Education / R. J. Shavelson, L. Towne. – Washington : National Academy Press, 2001. – 180 p.
19. Wilson E. B. An Introduction to Scientific Research / E. B. Wilson. – N. Y. : Courier Dover Publications, 1990. – 375 p.

Information Resources

20. Сайт вищої атестаційної комісії України. – Режим доступу : <http://www.vak.org.ua/index.htm>.
21. Сайт національної академії наук України. – Режим доступу : <http://www.nas.gov.ua/ua/main.html>.
22. Сайт Українського інституту науково-технічної та економічної інформації (УкрІНТЕІ). – Режим доступу : <http://www.uintei.kiev.ua>.
23. Management Science Journal [Electronic resource]. – Access mode : <http://pubsonline.informs.org/journal/mnsc>.
24. Science buddies [Electronic resource]. – Access mode : www.sciencebuddies.org.

EDUCATIONAL EDITION

**Guidelines for carrying out practical tasks
on the academic discipline**

"BASIS OF SCIENTIFIC RESEARCH"

**for students of training directions
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**Методичні рекомендації до виконання практичних
завдань з навчальної дисципліни**

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**для студентів напрямів підготовки
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Ум. друк. арк. 2,5. Обл.-вид. арк. 3,13. Тираж 50 прим. Зам. № 22.

Видавець і виготівник – видавництво ХНЕУ ім. С. Кузнеця, 61166, м. Харків, просп. Леніна, 9-А

*Свідоцтво про внесення суб'єкта видавничої справи до Державного реєстру
ДК № 4853 від 20.02.2015 р.*