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ORGANIZATION AND DEVELOPMENT OF THE DESIGN PROCESS IN THE WORLD PRACTICE

The process of design, or project execution, can formally be viewed as the development of a prototype or prototype of a proposed or possible object or its state. The design process is based on professional knowledge, achievements in science, technology, technological advances, and mathematical methods for solving engineering problems, the basics of art, economics, pricing policy, inventive activity, regulations, legislation and much more. The beginning of the design is determined by the presence of the main provisions on the proposed object and the sources of its financing. As a result, investment feasibility studies and other studies are usually carried out prior to project development. There are relevant rules for the selection of projects, tenders are considered and the documents are finally approved. Design includes many systems, as well as the knowledge of engineers - this is an integral part of the overall investment process, the main participants of which are the Investor, the Customer, the construction department (Contractor) and the design company. Abroad, design is one of the most important stages in the implementation of urban development projects. Studies have shown that about 15% of the project budget is spent on correcting design errors, and more than 50% of project changes are due to poor design in the early stages [1, 2].

This article analyzes the design process in various foreign countries, such as the USA, Great Britain, France, Germany, Singapore, Bulgaria, based on publicly available materials (regulatory documents, tender documentation, guidelines, websites of architectural bureaus and official websites of regional and city administrations). The approach to determining the cost of architectural design for the conclusion of work contracts is considered in two ranges:

1) Range of territory – documents containing development projects for elements of the planned structure of the city. Architectural and urban planning concepts, depending on the type of documentation adopted in the country;

2) Development range (buildings) – a document that defines the development project for the elements of the planned structure of the city, as well as architectural, functional, technical and constructive solutions for capital construction projects. Depending on the type of document adopted in the country, it can be draft, design or working.

The study of foreign practice of organizing the process of architectural and construction design has revealed a number of principles that can guide the authorities in ensuring high quality in the development and implementation of urban development projects.

Keywords: pricing, estimate, cost of construction, design enterprise, cost of design works, design services market, design process, preliminary design work, competitiveness, economic security, area range, development range (buildings).

Introduction. Considering the period of project activity until 2020, it is important to follow all the changes and quick response: at this time, the situation on the labor market, in the IT field, is changing very quickly, but the lack of qualified developers-designers remains the main headache for the construction industry, in particular in design. Foreign freelancers can help alleviate the talent shortage in these conditions by learning new ways to collaborate and look to professional freelance exchanges and services for direct interaction with project executors. Abroad, there are two approaches to the pricing of architectural and design services. In Europe and the USA, it is customary to determine the cost of design services as a percentage of the estimated cost of construction work per 1 m². Design work is a set of activities that includes the preparation of relevant documents (drawings, instructions, explanatory notes, and so on) that determine the scope and details of future construction and installation work. Such documents contain information about the cost and complexity of the project. They must be prepared before the start of construction of the property and the provision of various communication systems. Every year, the formation of the project services market is getting higher and more stable, that is, the market has entered a mature phase, in the period up to 2020. Customers with multi-billion investment projects place high demands on design companies not only in terms of qualifications and experience, but also in terms of financial and organizational viability. Design decisions are intended to be implemented at various hierarchical levels and require joint consideration and consideration of the influence of numerous natural, economic, social, and technological, skills and other factors. Project development is a specific activity called "designing" and provides a solution to a complex of interrelated technical, technological, architectural, socio-economic and environmental problems. The design process is a complex activity where success depends on the right combination of three sciences (natural sciences, arts, mathematics), art, mathematics) or more. Designers always consider real things that exist in an imaginary future, and are forced to look for ways and means of implementing the foreseen objects.

Analysis of studies and publications. The aim of the study is to analyze the design process in various foreign countries until 2020. After studying the literature, monographic material on design work, regulatory and methodological material, we were interested in the book of the 19th century foreign scientist J.K. Jones "Design Methods". It presents a fairly complete picture of modern design analysis (which is still relevant today), the methods of which are universal in nature and applicable in various fields: engineering design, artistic design, economic forecasting, and so on. This book suggests that there is no need to consider the process of designing a specific object, but it is enough to find out and state the general points necessary for design [3]. In the time period up to 2020, many international scientists, officials and decision makers at all levels in countries such as the United States, United Kingdom, France, Germany, Singapore, Bulgaria and so on have begun to talk about design work in construction with great attention. They understand how many different barriers need to be overcome (regulatory and legal requirements, compliance with rules and regulations, many approvals from inspections and supervisory authorities, project approval) in order to implement ideas. A lot of literature has been published abroad on the design of various civil and industrial facilities, as well as on the development of various products - auxiliary material. In any foreign country, there is a specialization in design [56, 63, 64,

65, 66, and 67]. According to the goal set, the studies described in the works of our Ukrainian scientists were considered: O.Yu. Belenkova [4], A.F. Goiko [9], A.S. Gritsenko [5, 10], Yu.A. Zapechna [6, 10], T.V. Mashoshina [7], Yu.T. Razumny and A.V. Rukhlov [8], L.V. Sorokina [9], T.Yu. Tsyfra [10, 11], Loktionova Ya.F. [13], L.V. Shumak [12, 13], and others. In their works, they considered issues related to the functioning of the foreign and Ukrainian market of design and construction works in modern conditions. In their monograph, the scientists Yu.T. Razumny and A.V. Rukhlov show the main approaches of modern design as a process of creating objects of future artificial human living spaces. And also considered some unique design tools for intelligent products and technical support [8]. An analysis of the literature showed that the international and domestic project market has not yet been sufficiently studied and requires changes. The need for a reasonable solution to the problems of organization and development of design in world practice until 2020 determines the relevance of this article.

Setting the task. The statement of the problem and the purpose of this article are to consider the features of the organization and development of design in world practice until 2020 using the example of a number of foreign countries. Reveal the main secrets of the design market of design services. To achieve the goals and objectives set in the article, a number of questions were considered, such as: – what methods are used to determine the cost of design work?; – what procedure is required for projects with state participation?; – what research and forecasts are needed to prepare a master plan - a conceptual document for the development of the territory? And so on.

Main part. Estimation of the cost of design work is carried out by the person ordering the design work (the person who plans, purchases materials, concludes a contract and makes payment). It's about the customer. There are various types of estimates, including: – planned cost - this is a preliminary estimate of the cost of design work, used for planning purposes at the project budgeting stage; – cost is an estimate of the cost of project work used as a starting point for initiating procurement procedures; – the contract amount is the amount paid to the Contractor after the Customer receives the completed design work in accordance with the terms of the contract – is mainly determined by the specific terms of the contract.

Methods for determining the cost of project work

In international practice, Clients determine the cost of design work by methods consisting of two groups:

1. Market analysis – is to determine the cost of design work based on information about the cost of similar work. The customer, collecting such information, estimates the cost based on the analysis. Possible sources of information include: – Quotations from Suppliers received for purchases; – data from internal and public information systems about tenders of Suppliers; – data from internal and public registers on signed and executed contracts; – other publicly available information (press releases, price lists, expert studies and analyses). Usually, in practice, Customers most often use as a source of information the commercial offers of Suppliers received for procurement (they do not need to look for information on similar design work). The advantages of this method: – allow you to determine the cost of design in a short time; – it is easy to use; – the correct use of this method allows you to establish the market value of the work. Disadvantages of this method: – it leads to the inclusion of irrelevant information in the analysis, which leads to incorrect cost estimates; – there is a risk of using unreliable or irrelevant sources of information (outdated price lists and so on); – there is a risk of collusion between market participants providing offers in order to overestimate the cost. The simultaneous use of several sources of information can compensate for the shortcomings of this

approach. Monitoring can serve the same purpose – systematic accumulation and analysis of information on the cost of design work by the Client (Customer).

2. Estimate methods (calculation method) – the essence is to determine the cost of design work based on various basic units for which prices are pre-set.

A. Based on natural indicators of design objects (NPO) - the method consists in determining the natural value characterizing the scope of design work, and multiplying it by a predetermined price of the corresponding base unit. In practice, the method is used to determine the cost of: – a territorial planning project (projected area in hectares); – design and working documentation (total area of the object square meters, construction volume of the object m3, "number of seats", one design object, design area in hectares, and so on). Advantages of this method: – it is less labor intensive and gives an accurate idea of the design cost. Disadvantages of this method: – allows you to determine the cost only for similar design work that was previously estimated and included in the relevant directories; – it is impossible to choose the correct basic unit of measurement for all types of design work; – special skills are required to correctly determine the type and scope of the project and apply correction factors that take into account the characteristics of the work being assessed (for example, reuse of documents, the participation of foreign Contractors).

B. As a percentage of the cost of construction and installation works (CIW) – the method consists in determining the share of the cost of design work from the cost of the planned construction and installation works. In foreign practice, this method is used to determine the costs of: – design project (for example, corresponding to the concept stage); – design and detailed – working documentation (for example, the corresponding phase of design and definition – design and definition stage). The advantages of this method: – it is useful for determining the planned costs at the stage of project budgeting; – unlike other cost estimation methods, it requires up-to-date prices for only one indicator – the cost of construction and installation (CIW) – and therefore is useful in unstable economic conditions; – no special skills required. Disadvantages of this method: – assumes a direct relationship between the design load and the expected costs of the implementation of the object, which is not always true; – the costs of implementing the predicted objects must be correctly estimated.

C. Based on the labor costs of design work performers – the method determines the cost of design work as the sum of the Contractor's labor costs, overhead costs and the normal rate of return. This method can be used for all types of considered documents. The advantages of this method: – allows you to determine the cost of any type of document, regardless of the complexity or size of the project or the availability of similar products on the market; – is the most accurate of the valuation methods considered. Disadvantages of this method: – may not allow to fully estimating all direct and indirect costs; – requires a high level of skill. First you need to understand the scope of the project and determine the necessary resources; – Contractors can use indirect costs as a tool to manipulate contract value.

In-kind indicators of design objects and estimators based on interest rates create directories in which prices are set for certain types of work based on data on completed projects. The use of the labor cost method is possible due to the use of reference books with standardized prices or the use of the Customer's past experience. In foreign countries, such guidelines are approved at the federal level. For example, in Germany, the "Regulation on the Remuneration of Architects and Engineers" applies to all persons performing construction work in the country. The creation of budget guides is recommended at the industry and intra-company levels. In international practice, it is customary to use such reference books compiled by consultants and approved by

professional organizations. Changes in the structure and procedure for the preparation of documents on land management, design of buildings and structures and landscaping will require either correction of already used reference manuals or preparation of new manuals. The choice of the optimal method for determining the cost of design work is based on the following criteria: – the stage of the documentation process; – legal status of the Customer; – other criteria (external: the availability of available information, typicality of the development object, criteria of the method itself: speed, accuracy, simplicity). In order to choose the best method for calculating the cost of the project, at this stage it is necessary to find out if the Customer has any legal restrictions. Then other criteria are analyzed. The general algorithm for choosing the most appropriate costing method is shown in Figure 1.

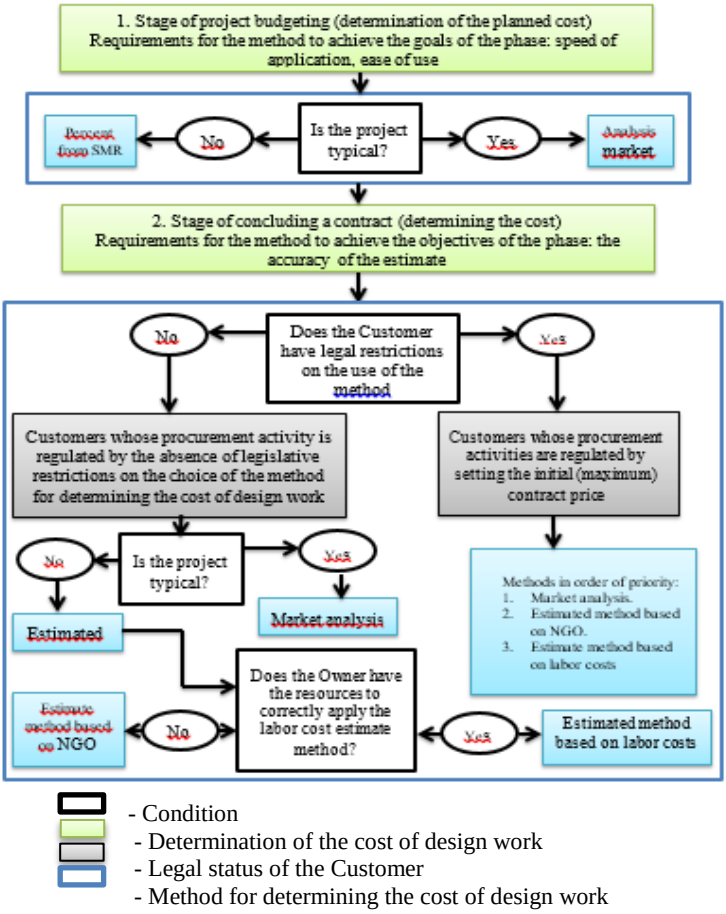

Figure 1 General algorithm for choosing the optimal method that determines the cost of design work *(Author's development)*

Costing for production and costing of products (works, services) can be carried out by different enterprises or even different production sites or farms of the same enterprise using different methods. The choice of method depends on the characteristics of the industry, the volume and frequency of production, the organization and technology of production, planning methods, the state of technical regulation, and many other factors.

Considering the time period until 2020, at the stage of budgeting for territorial development projects, the planned cost of design work is determined. At this stage, the amount of information necessary for accurate calculations is usually not available; the estimate of the planned cost may deviate by 15-20% from the price estimate determined for the start of the procurement procedure. It is advisable to choose the earliest and simplest method for determining the planned price: – the method of market analysis; – an assessment method based on the percentage of work completed (CIW). The resulting target cost estimate is used to determine the Customer's next steps to obtain the document.

In order to carry out the procurement procedure as a starting point at the stage of concluding a contract, the Owner needs to determine the cost of design work. It is necessary to use greater accuracy of calculations. It can be provided by the following calculation methods: – market analysis method; – methods of assessment based on NGO; – labor law. Project development should begin with preliminary studies and conceptualization of the site and future facilities. These steps can help coordinate the development of building solutions (when developing documentation) faster and at a lower cost. Developers need to take into account the economic, environmental, social and other conditions in the area where construction will be carried out. This requires attention to pre-project studies designed to identify site constraints; user needs and wishes, and define project objectives. In the world experience, holding architectural competitions and including their results in the design process has become part of architectural practice. As a result of the competition, several options for the vision of the project are created, which are then selected by the public. Thus, the competition serves as a tool to inform the public and involve them in future design.

The process of architectural and construction design United States of America (USA)

In the field of architectural standardization, the most authoritative organization in the United States is the American Institute of Architects (AIA) [14], founded in 1857. AIA develops and publishes guidelines and contract templates to manage the design and construction process. B101™-2017 [15] is a standard form of agreement widely used in the USA between Clients and Architects for the management of large construction projects. According to the contract, the services are divided into: basic, auxiliary and additional. The main services are carried out in five stages: preliminary design, design, construction documentation, procurement and construction. Ancillary services are described in the contract at the time of signing the contract (conclusion of the contract). Additional services may arise during the implementation of the project. The contract provides for payment to the Contractor in the form of a share of the project budget or a predetermined amount.

Preliminary design work in the USA consists of:

1. Conceptual design (draft design). The project team develops the concept and prepares sketches and, possibly, a three-dimensional model of the object. The concept and sketches are approved by the Client (Customer).

2. Design documentation. The project team prepares detailed drawings and technical specifications with a list of materials that will be used in the construction and finishing of the facility.

3. Working documentation. After the Customer has approved the project documentation, detailed drawings and specifications are prepared to determine the cost of construction and project management. The drawings and specifications become part of the construction contract.

4. Procurement stage. The Customer selects and hires the Contractor. The project team can provide advice and assistance in the preparation of tender documents, invitations to tender and conditions for tenderers.

5. Stage of construction. Architects may visit the construction site to supervise, review and approve Contractor's tenders, make payments and report to the Client on the progress of the project. The contractor is solely responsible for construction methods and schedules.

Table 1

Organization of the design process in the United States of America (USA)

No	Stages	Original title	Use	Target	Result	Executor
1	Preliminary design	Schematic Design	Necessarily	Consideration of project options, determination of time costs, correlation of decisions with the budget	Sketches and 3D models that give a general idea of the characteristics of an object	State authorities/design company/Customer
2	Project documentation	Design Develop-ment	Necessarily	Detailing of object drawings, project schedule. Bringing documentation in line with regulations	Detailed object drawings	Project enterprise
3	Working documentation	Construction Djcumenys	Necessarily	Construction plan development	Design materials in the composition necessary to start construction work	Project enterprise
4	Procurement	Procurement	Necessarily	Consideration and selection of proposals for the performance of work and the supply of materials	Concluded contracts with contractors and suppliers of materials	State authorities/design company/Customer
5	Construction	Construction	Necessarily	Supervision of construction works	Built object	Construc-tion company
6	Commissioning	Project Closeout	Necessarily	Transfer the object to the operating company and the owner	The object put into operation	Construc-tion company and design enterprise

(Author's development)

Table 2

USA. Territory Range

1	Document type	Local Comprehensive Plan	District Plan	Master - plan *
2	Original name	Local Comprehensive Plan	Neighborhood/Community Plan	-
3	Customer	State bodies	- State bodies; - Private developers; - Community of local residents and tenants	- State Customers; - Private developers

** Although not required by law, there are development practices.*
(Author's development)

Document Procurement Rules – at the national level, procurement in the building construction sector is governed by Part 36 of the Federal Acquisition Regulations (FAR) [16]. There is no information on methods for determining the cost of design work for state Customers. Private developers usually use the labor cost method to determine the cost of developing a master plan for the territory (Master Plan) [17].

Table 3

USA. Building range (buildings)

1	Document type	Preliminary design	Project documentation	Working documentation
2	Original name	Schematic Design	Design Development	Construction Documents
3	Customer	- State bodies; - Private developers	- State bodies; - Private developers	- State bodies; - Private developers

(Author's development)

Purchasing regulations vary depending on the laws of each state.

The cost of design work is determined by the following methods: – an estimate method based on labor costs [18]; – an estimate method based on a percentage of the cost of construction. Recommendations for using this method on projects with a budget are often approved at the city and state levels [19]. The total cost of design work is usually 10-15% of the cost of construction and installation work and 10-20% of the cost of a preliminary design.

Great Britain (England)/ The Royal Institute of British Architects (RIBA) [20] is the UK's most authoritative body for design and building standards. According to a study by RIBA, its documents and guidelines are a key reference for 80% of architects and design organizations across the UK. Based on the RIBA recommendations for the design and construction phase, the PAS 1192-2:2013 standard [21] was developed to implement the BIM Level 2 protocol. Since 2016, the standard has been gradually implemented at the national level, becoming mandatory for all budget projects. Pre-project work in the UK is built as follows:

1. Technical specifications. Before the start of the project, in accordance with Article 42 of the Public Procurement Law [22], a technical assignment is drawn up describing the nature of work and services, materials and their characteristics, construction methods, testing, acceptance control and other necessary conditions. Specifications may also include instructions for transferring intellectual property rights. Technical specifications are published in accordance with EU rules and procurement legislation for the purpose of selecting a Contractor for the project. Based on technical specifications, tenders are held and Suppliers are selected. In accordance with the General Minimum Standards for Public Procurement in Construction [23], contracting authorities are required to comply with the BIM Level 2 protocol and GSL procedures and require Suppliers to comply with them.

2. Project program – is developed on the basis of technical specifications, within which: – the tasks of the project were updated; – the roles of participants are distributed, the structure and schedule of work are determined; – the requirements for the functionality of the facility, its performance, cost (capital and operating costs), energy and resources are determined; – capital and time costs are determined; – the geospatial characteristics of the site are checked; – the compliance of the project with safety requirements and other regulatory documents is checked; – the economic and social consequences of the project and its impact on the urban environment are determined.

3. Concept – describes the aesthetic and functional features of the object based on the program. BIM protocols are used for design and preliminary calculations. The concept includes: – description of the architectural form and spatial configuration of the object; – general structural drawing of the building; – a schematic diagram of the engineering system; – general characteristics of the object (frameworks, surfaces, and so on); – preliminary cost calculations (estimate) – example: per m2, in accordance with the standards for determining the cost of construction projects [24]; – acoustics, fire engineering design, construction supervision, maintenance and operation; – preliminary estimates of energy consumption; – land plan. The project approval process with the local planning authority can begin at this stage.

4. Project documentation – it is possible to involve contractors (early contractor engagement). BIM protocols are used for project coordination and cost estimation. Project documentation includes: – actual design and coordination of design solutions and engineering systems; – project estimates; – project strategy.

5. Working documentation – documentation is submitted for obtaining a building permit. Working documentation includes: – detailed information about the architectural form of the building, design and engineering systems of the facility; – complete construction plans; – specifications and designs prepared by the Subcontractors in accordance with the previous stages (specialist subcontractor design and specifications – specialized projects and specifications of the Subcontractors); – the approved maximum cost of the project.

Regulations for the procurement of documentation – for public Customers, the procedure for conducting competitive procedures for contracts exceeding the thresholds established by the EU Public Procurement Directive [25] is set out in the Public Procurement Regulation [26].

Table 4

Organization of the design process in the United Kingdom (England)

No	Stages	Original title	Use	Target	Result	Executor
1	Technical specifications	Technical specifications	Necessarily	Determination of the nature of works and services, methods of construction and other specifications of the project	Description of the technical characteristics of the project	State authorities/design company/Customer
2	Project program	Brief	Necessarily	Distribution of the function, updating the task and the formulation of the main requirements for the object	Project sketch and distribution of functions of performers	Project enterprise
3	Concept	Concept	Necessarily	Determination of the aesthetic and functional charac-teristics of the object	Project materials that allow a comprehensive assessment of the project	Project enterprise
4	Project documentation	Definition	Necessarily	Approval of the aesthetic and technical characteristics of the object	Design materials in the composition required for obtaining a building permit	Project enterprise
5	Working documentation	Design	Necessarily	Clarification of all parameters for preparation for the tender and construction work	Design materials in the composition necessary to start construction work	Project enterprise
6	Construction and supervision	Build and Commission	Necessarily	Transfer of tasks from the project team to the construction company and the supervisory company	Constructed object	Construction company and supervisory authority
7	Putting into operation	Handover and Closeout	Necessarily	Informing the operating company and users about the principles of operation of the facility	Readiness of the facility for operation	Construction company, operating company supervisory authority
8	Exploitation	Operation	Necessarily	Customer or operating company technical support	The process of operating the object	Operating company/Customer

(Author's development)

Table 5

Great Britain. Territory Range

1	Document type	District plan	Master – territory plan*
2	Original name	Neighborhood plan	-
3	Customer	- Community Council; - Community of residents	- State bodies and quasi-state organizations (regional development agencies, national agencies, hospital complexes, universities, etc.); - Private developers

(Author's development)

** Although not required by law, there are development practices.*

Methods for determining the cost of design work (costs) is determined by the following methods:

– estimated method based on labor costs. The composition of the estimate depends on the nature of the project and the composition of the team [27];

– an estimate method based on the percentage of construction and installation works (CEW) [28];

– mixed method: the cost of the project is calculated on the basis of internal estimates and is expressed as a lump sum. If there are additional works that go beyond the scope of the original contract, the labor-based method is used [29].

Table 6

Great Britain. Building range (buildings)

1	Document type	Technical specifications	Project program	Project concept	Project documentation	Working documentation
2	Original name	Technical specification	Brief	Concept	Definition	Design
3	Customer	- State bodies; - Private developers	- State bodies; - Private developers	- State bodies; - Private developers	- State bodies; - Private developers	- State bodies; - Private developers

(Author's development)

Regulations for the procurement of documentation – the same as in the Regulations on the procurement of unified documentation of the territory.

Methods for determining the cost of design work: – method of evaluation based on labor costs. Studies have shown that the average hourly rate for an architect is £60 [30]; – an estimation method based on the percentage of construction work. According to the recommended rules for evaluating construction projects, the cost of design work is calculated according to the following formula: (a x b), where a – is the estimated cost of construction and installation works; b – percentage of the contract value, which is taken on the basis of an analysis of similar construction projects. The cost of preparation of project documentation (stages 1-5 in accordance with the RIBA stage) averages 4.5% of the cost of construction and installation works. The cost of the conceptual design (RIBA stages 1-3) is approximately 35% of the total cost of the design documentation (stages 1-7), defined as 6.5% of the construction and installation costs. Thus, if construction and installation works are estimated at 1 million euros, the total cost of the design work is 65,000 euros, and the cost of the conceptual design is approximately 23,000 euros.

France/ Construction in France is strictly regulated. The use of illegal labor is punishable by law. French building codes are constantly changing to accommodate new building technologies, improve building quality and maximize public safety. Failure to

comply with these regulations can result in heavy fines. For this reason, construction can only be carried out by specially licensed companies that are responsible for compliance with all regulations. In addition, construction work must be carried out by a licensed French architect. This is necessary in order to fully take into account the peculiarities of the landscape and not violate French standards. According to French law, for the construction or renovation of any building over 150 sqm, an architectural design must be provided. This article describes the features and procedures for building projects in France.

The design phases in publicly funded projects are defined in the Public Works Design Act [31]. The order on the specification of requirements for phases in projects with public funding [32] describes in detail the goals and objectives of each phase. Pre-engineering work in France consists of:

1.Preliminary design (draft design) – in accordance with the Public Procurement Law [33, 34, 35]. Prior to the commencement of design work, the Customer must prepare a Terms of Reference containing: – a description of the work and services covered by the contract; – an indication of the transfer of intellectual property rights; – references to standards (international, national, European) or requirements for the performance and operation of the facility; – environmental characteristics and socio-demographic profile of building users. Conceptual designs are prepared on the basis of technical specifications. Their goal is to offer several options for design solutions and determine the preliminary time costs for their implementation. The development of a conceptual design (sketch) may be entrusted to the Contractor. The main outputs at this stage include: – drawings and sketches describing the architectural and functional features of the site on a scale of 1:200 to 1:500; - an economic and technical report, including a project completion schedule and an assessment of the project's impact on the environment, local development, and so on.

2.Preliminary design – includes general plans for the project site, a preliminary work schedule and cost estimates. The analysis of the project is completed and the compliance of the project with legal, regulatory and environmental requirements is verified. The documentation includes: – site plan on a scale of 1:200; – general view of the facade; – assessment of the total cost; – total time estimate.

3.Project documentation – includes the preparation of detailed site drawings, detailed requirements for materials and structures, and the final project estimate. Prepared: – plan of the land plot on a scale of 1:500; – drawings of the facade (including dimensions of doorways and windows, scale 1:100), typical sections of the building, floor plans, drawings of facade materials and colors; – cost estimates, preliminary design calculations; – reports on fire safety, accessibility for people with reduced mobility, and so on. After consultation with the relevant parties and competent authorities, the necessary changes are made to these documents and an application for a building permit is submitted. To obtain a permit, you must submit the following documents: – a complete set of documents (including drawings on a scale of 1:100 to 1:500) with a full description of architectural, structural, engineering and other solutions; – landscape design solutions; – energy efficiency calculations; – project budget.

4.Working documentation – on the basis of a building permit, construction documentation is prepared. A construction plan is developed, the cost of construction is fixed and the date of commissioning of the facility is determined. Stage result: – working draft of architectural solutions; – detailed (working) design of a constructive solution; – detailed design of engineering solutions; – energy efficiency calculations; – statement of construction volumes; – cost estimate for the project; – a schedule of construction work indicating the required number of specialists who will be involved; – tender documentation for the selection of a construction Contractor. In accordance with

Table 7

Organization of the design process in France

N	Stages	Original title	Use	Target	Result	Executor
1	Preliminary design	Les etudes desquisse (ESQ)	Necessarily	Consider project options, pre-determine time costs, correlate solutions with budget	Plans giving a ge-neral idea of the architectural and functional characteristics of the object	Project enterprise
2	Preliminary project	Les etudes d'avant projet sommaire (APS)		Detail constructive plans, project schedule. Bring the draft design into compliance with the standards	Plans that allow a more detailed assessment of the project, a financial report on the cost of the project	
3	Project documentation	Les etudes d'avant projet definitif (APD)		Work out a detailed design of the object; provide deta-iled information about buil-ding elements, materials, structures. Make a final cal-culation of the project cost	A set of documents that fully describes the architectural, structural and engi-neering solutions of the project	
4	Working document	Les etudes de projet (PRO)		Develop construction plans. Determine the final cost and date of commissioning	A set of documents in the compositeon necessary to start construction work	
5	Tenders and Procurement	L'assistance apportee аи maTtre de L'ouvrage pour la passation du contrat de travaux (ACT)		Consideration and selection of suitable proposals for the execution of works and the supply of materials	Signed contracts	
6	Planning, implementa-tion and management of construction works	Les etudes d'execution ou I'exa-men de la conform ite a и pro jet et le visa de celles qui ont ete faites par l'entrepreneur (EXE) La direction de ['execution du contrat de travaux (DET) L'ordonnancement, le pilotage et la coordination du chantier (OPC)	Necessarily	- Transfer tasks from the project team to the construction and supervisory company. - Ensure compliance of works and working documentation, correlate construction stages with the work schedule and ensure their implementation	Successful completion of construction work, completed facility	Design, construction ompany, supervisory authority, Chief Architect
7	Commissioning	L'assistance apportee au maTtre de l'ouvrage lors des operations de reception et pendant la periode de garantie de parfait achievement (AOR)	Necessarily	Transfer the object to the operating company and the owner. Ensure interaction with the operating company for effective facility management	Commissioned object	Engineering company, Contractors

(Author's development)

the NFP 03-100 standard [36], government projects are subject to regular technical inspection at all of the above stages to ensure the safety of construction and operation

(safety of building materials and structures). All types of work and documents are checked by the inspection.

5. Tenders and Procurement – for public projects, the procedure for selecting Contractors is regulated by the above-mentioned Public Procurement Law. Public procurements [37] in excess of €5.25 million must be published at the European Union level as they may involve Contractors from other countries.

Table 8

France. Range of territory

1	Document type	Local plan	Master - plan *
2	Original name	Plan local cTurbanisme (PLU)	-
3	Customer	- State authorities (local planning authorities)	- State bodies; - Private developers

(Author's development)

** Although not required by law, there are development practices.*

Rules for the preparation of procurement documentation: for public customers, the procedure for conducting competitive procedures for contracts exceeding the thresholds established by the EU Public Procurement Directive [38] is determined by the Procurement Regulations [39] and contracts (contracting) [40]. The regulation applies to all public procurements over EUR 25,000. The methodology for calculating the costs of preparing documents is information that is not available to the public.

Table 9

France. Building range (buildings)

1	Document type	Draft design	Preliminary project	Project documentation	Working document ation
2	Original name	Les etudes d'esquisse (ESQ)	Les etudes d'avantprojet sommaire (APS)	Les etudes d'avantprojet definitif (APD)	Les etudes de projet (PRO)
3	Customer	State bodies; Private developers	State bodies; Private developers	State bodies; Private developers	State bodies; Private developer s

(Author's development)

Regulation on Procurement Documentation: Procurement of construction and infrastructure projects by government customers is regulated by Law No. 85-704 [41]. Procurement of projects exceeding the thresholds set by the EU Public Procurement Directive is subject to the aforementioned regulation. The cost of design work is determined by the following methods: – Estimate method based on labor costs; – valuation method based on a percentage of the volume of construction work. For projects with state participation, this percentage ranges from 8% to 13% of construction and installation works, in accordance with the official guidelines for government contractors [42]. The cost of developing a project concept (ESQ and APS stages) is from 30 to 34% of the total cost of design work. Thus, if the construction and installation works of the project are 1 million euros, the total cost of the design work is 110,000 euros, of which approximately 35,000 euros is for the conceptual design.

Germany. In Germany, the design phase is regulated at the federal level by the "Regulation on the fees of architects and engineers" (HOA1) [43]. The HOAI edition, in force since 2013, regulates the remuneration of specialists providing design services in the field of construction and territorial planning. The document was officially adopted in 1977 and has been amended seven times, which indicates a process of continuous improvement in this area. The planning procedure is set out in §34 (Leistungsbild Gebaude). In §34 (Leistungsbild Gebaudeund Innenraume), the German Federal Ministry of Economics and Technology defines nine stages and their percentage of the total project cost.

Pre-project work in Germany includes the following:

1. Baseline assessment – at this stage, the principles of the project is developed, and the composition of the project team is determined. The baseline assessment consists of: – a general description of the goals and objectives of the project; – information about the land plot; – information on the scale and volume of construction; – financial framework; – other wishes of the Customer.
2. Preliminary planning – preparation of sketch drawings, preliminary negotiations with construction and regulatory authorities to clarify the feasibility of the project and preliminary cost estimates. Presentation by the project team: – the results of the feasibility study, agreed with all parties involved in the project; – preliminary planning documents (presentations, object options assessments, scale drawings in accordance with the type and size of the building); – substantiation of key decisions in accordance with the requirements of the urban planning document; – protocols on the rights to negotiate; – cost estimate (project cost estimate) in accordance with DIN 276; – schedule of the main stages of planning.
3. Draft design – drawings are created, including floor plans, sections and the appearance of facades. A detailed cost calculation is carried out. As a result, the project team must submit the following: – drawings in the required volume (scaled 1:100 for the building and 1:50-1:20 for the premises); – written proposals and recommendations for project participants; – project plans updated as the work progresses; – minutes of negotiation of rights; – cost estimate (cost estimate) for the project in accordance with DIN 276.
4. Project documentation – a building permit is obtained: the necessary package of documents is prepared, and the application is sent to the relevant authorities.
5. As-built documentation – detailed drawings are prepared, made on a scale of 1:50 with enlargement for critical elements after obtaining a building permit. The documentation must include the following: all information necessary for the construction or renovation of the structure.
6. Preparation for the conclusion of the contract – consists in the formation of a list of purchases, the selection of Contractors and the subsequent determination of labor costs for the conclusion of the contract. Coordination and approval of all project participants is required.
7. Conclusion of contracts – proposals from contractors are considered. The best and most suitable option is determined, and a commercial offer is prepared.

Relevant Procurement Documents: For contracting authorities, a number of documents, including the General Regulation on Public Procurement (GWB) [44], regulate the procedures for tendering contracts that exceed the thresholds set by the EU Public Procurement Directive [45].

Table 10

Organization of the design process in Germany

N	Stages	Original title	Use	Target	Result	Executor
1	Base score	Grundlagenermittlung	Necessarily	Definition of project principles	Description of the technical characteristics of the project	State authorities/ Design company/ Customer
2	Advance planning	VorpLanung	Necessarily	Clarification of the feasibility of the project. Preliminary cost estimate	A preliminary look at the project and the distribution of the functions of the performers	Project enterprise
3	Preliminary design	Entwurfsp la ruing	Necessarily	Definition of visual and technical parameters of the project	Drawings of floor plans, sections and appearance of facades. Detailed project estimate	Project enterprise
4	Project documentation	Genehmigungsplanung	Necessarily	Approval of the main aesthetic and technical characteristics of the object	Design materials in the composition required to obtain a building permit	Project enterprise
5	Executive documentation	Ausfuh rungs planting	Necessarily	Detailing of all parameters for preparation for construction work	Detailed working drawings and instructions	Project enterprise
6	Preparation for the conclusion of the contract	Vorbereitung der Vergabe	Necessarily	Clarification of all parameters for preparation for the tender and construction work	Approved contract requirements	Customer/Design Company
7	Conclusion of a contract	Mitwirkung bei der Vergabe	Necessarily	Consideration and selection of suitable proposals for the conclusion of a contract	Signed contract	Customer/Design Company
8	Project and Construction Supervision	Objektuberwachung - Bauuberwachung und Dokumentation	Necessarily	Transfer of tasks from the project team to the construction and supervisory company	Constructed object	Constructi-on company/supervisory authority
9	Exploitation	Objektbetreuung	Necessarily	Issuing final invoices. Supervision of the fulfillment of warranty obligations	Successful building operation process	Construction company/ Замовник

(Author's development)

Table 11

Germany. Range of territory

1	Document type	Land use plan	Development plan	Master - plan *
2	Original name	FLachennutzungspLan (FNP)	Bebauungsplan (B-Plan)	-
3	Customer	- State bodies (local planning bodies, district administrations)	- State bodies (local planning bodies, district administrations); - Private developers	- State bodies (local planning bodies, district administrations); - Private developers

(Author's development)

** Although the law does not require this, but there is a development practice. Detailed development plans can serve as master plans (master plan)*

Methods for determining the cost of design work – the regulation of architectural work in Germany is based on the Regulation on the fees of architects and engineers (HOAI) [43]. The revised HOAI, in force since 2013, regulates the remuneration of architects and engineers providing design services at the national level - DIN 276-1:2008-12 standards. HOAI – is the so-called law of one price (one price Law), provides that the established fee is mandatory for both the Customer and the Contractor under the so-called law of one price. It sets the minimum and maximum prices within which the parties can negotiate the amount of the contract. The provision applies to contracts with a value of not less than 25,000 euros and not more than 25 million euros.

1. Land use planning. Development costs are calculated according to two criteria: – natural indicator – projected area; – the complexity of the project. The complexity of the project is evaluated and determined on a three-point scale based on the following criteria: – importance in the regional structure; – variety and density of functions; – the structure of settlements and public spaces; – transport and urban infrastructure; – geology, topography and cultural landscape; – nature, climate and environmental protection. The total number of points scored determines the category of project complexity: – up to 9 points – Category I; – 10-14 points – Category II; – 15-18 points – Category III. The cost of preparing a land use plan based on the area of the territory and the complexity of the project is determined according to the table contained in the regulation (Table 25).

2. Development Planning. – The method of determining the development planning fee is similar to the method of determining the land use planning fee, with the only difference being the scoring criteria for determining the complexity of the project and the set rate.

Table 12

Germany. Building range (buildings)

1	Document type	Advance planning	Preliminary design	Project documentation	Executive documentation
2	Original name	Vorplanung	Entwurfspianung	Genehmigungsplanung	Ausfuhrungsplanung
3	Customer	State bodies; Private developers	State bodies; Private developers	State bodies; Private developers	State bodies; Private developers

(Author's development)

The rules for purchasing documents are the same as in the general rules for purchasing documents in the territory range.

Methods for determining the cost of design work. – is determined on the basis of two criteria: – the cost of construction work; – the complexity of the project. To determine the complexity of the project, it is evaluated according to the following criteria: – requirements for integration with the environment (1-6 points); – functional complexity (1-9 points); – requirements for structures (1-6 points); – design requirements (1-9 points); – technical equipment (1-6 points); – finishing (1-6 points). The total number of points awarded determines the category of project complexity: – up to 10 points – Category I; – from 11 to 18 points – Category II; – from 19 to 26 points – Category III; – 27-36 points – Category IV; – 35-42 points – Category V. The cost of construction work and documentation, depending on the complexity of the project, is determined according to the table contained in the Regulations (table 26).

In percentage terms, the total cost of architectural and construction design is from 5% to 12% of the cost of construction and installation work. The cost of the conceptual design (stages 1-3 according to HOAI) is 24% of this cost, or 2% to 4.5% of the construction cost. If the final construction cost is €1 million, then the total architectural design cost is approximately €130,000, of which approximately €31,000 is conceptual design.

Singapore. In Singapore, where space resources are limited, efficient land use and mixed-use development are urban planning priorities. In 2011, the General Directorate of Construction developed the Construction Performance Regulation Code. It is aimed at improving technologies and construction methods to reduce financial, labor and time costs, primarily through the standardization of structural elements and materials. To evaluate projects according to these criteria, the Code of Practice introduces a points system (Buildable Design Score). Approval of building plans requires a certain minimum score, depending on the type of building and the total area. The criteria are regularly updated, gradually tightening the requirements. The current version of the document is the 2015 edition [46]. Estimating the cost and ease of maintenance of buildings at the design stage can optimize design decisions. In 2016, a working group formed from representatives of construction authorities, other government bodies and professional associations published a guide to assessing the effectiveness of the project [47]. This document is advisory in nature. In 2010, the Construction Agency launched the BIM technology program as one of the measures to meet the government's goal of increasing the efficiency of national construction by 25% by 2020. The original goal of the program was to have 80% of Singapore's construction industry participant's move to BIM technology by 2015 [48]. In 2015, 100% of design enterprises participating in government contracts switched to BIM [49]. New requirements for building permit applications have also been introduced. Documentation for projects with a total area of more than 5000 m2 must be submitted in the form of a BIM model through a special Corenet platform, and not in the form of drawings or diagrams. For small projects, this procedure serves as a guide to action: as of 2017, construction projects approved in this way since the introduction of this requirement accounted for 92% of the total area of construction projects for the specified period [50].

In Singapore, the design and construction phases are regulated at the national level by the City Development Authority and the Building Authority. In 2015, the Construction Authority introduced a requirement that large construction projects be submitted as BIM models. Design and construction phases that meet the requirements are specified and enshrined in the national BIM Guidelines [51, 52].

The pre-project work in Singapore consists:

1. Research and analysis. Concept preparation. At this stage, a project program is developed and signed, which includes the Customer's goals and indicators for assessing the achievement of goals at each stage of the project life cycle. After agreeing on the program, the necessary surveys and engineering studies are carried out, the concept of the project is developed, and the main parameters of the project are preliminarily determined. If the

project does not comply with the permitted types of use of the site and the limiting volumetric and spatial parameters of development established by the Master Plan, it is necessary to submit an application for its approval to the Office of Urban Development (Outline Application) [53].

2. Draft design – includes the preparation of drawings on a scale of 1:200 indicating the location of the site, facade plan, floor plans, load-bearing structures and engineering systems, and so on. Documents prepared at this stage are submitted to the City Development Authority, which issues a permit for obtaining a planning permit [Planning Permission] [52]. During this process, the project is assessed for compliance with the volumetric and spatial building standards.

3. Design - project – the approved conceptual design is specified and detailed on a scale of 1:100 – 1:50 for the general plan and 1:20 – 1:5 for details. The application for a building permit is then submitted to the Building Authority. The necessary documentation includes [54, 55, 56]: – drawings of the land plot; – floor plans; – construction plan of the building; – evaluation of the project in accordance with the form of the Code of Construction Efficiency Rules; – other documents.

Table 13

Organization of the design process in Singapore

No	Stages	Original title	Use	Target	Result	Executor
1	Research and analysis. Concept preparation	Feasibility and planning. Conceptual Design Outline	Necessarily	Conducting research and surveys, defining the program and concept of the project, developing preliminary plans for the facility	Program and concept of the project, preliminary schematic plans of the project	State authorities/ design company /Customer
2	Preliminary design	Schematic design		Preparation of project documentation for the application for planning permission	Design materials in the composi-tion required to obtain a planning permit	Project enterprise
3	Design project	Design development stage		Preparation of documentation for applying for a building permit	Design materials in the composition required for obtaining a building permit	Project enterprise
4	Tender documentation	Tender documentation		Consideration and selection of propo-sals for the conclusi-on of contracts	Signed contracts	Design company/ Customer
5	Construction	Construction		Transfer of tasks from the project team to the construction and supervisory company	Constructed object	Construction company
6	Commissioning	Final completion		Issuing final invoices, supervising the fulfillment of warranty obligations	The process of building operation	Customer / Design company / Construction company

(Author's development)

Table 14

Singapore. Range of territory

1	Document type	Special and detailed control plans
2	Original name	Special and Detailed Control Plans (SDCP)
3	Customer	- Urban Development Authority

(Author's development)

Document Procurement Rules – as part of Singapore's master planning process, the Urban Development Authority (URA, Singapore's territorial development authority) develops specific areas and detailed management plans. If external Contractors are required, URA may organize a tender in accordance with the Public Procurement Rules [57, 58], which apply to contracts in excess of SGD 70,000. Method for determining the cost of design work – if the Urban Development Department initiates a competition for the development of a project / concept of the territory, the winning project team receives a reward in the form of a lump sum payment, the amount of which is determined by the conditions of the competition [59].

Table 15

Singapore. Building range (buildings)

1	Document type	Research and analysis. Concept preparation	Preliminary design	Design project
2	Original name	Feasibility and planning. Conceptual Design Outline	Schematic design	Design development stage
3	Customer	- Housing and Development Council; - Private developers	- Housing and Development Council; - Private developers	- Housing and Development Council; - Private developers

(Author's development)

Procurement Documentation Provisions – Public procurement procedures are governed by the Public Procurement Rules. The selection of Contractors is determined based on the Quality Fee Method [60], which is applied to construction projects with a total area of more than 2000 m2. This method takes into account not only the lowest bid, but also qualifications and experience with similar projects when selecting Contractors. Methods for determining the cost of design work – can be determined in accordance with the "quality / cost" method: – Estimate method based on labor costs; – Estimate method based on labor costs.

Bulgaria. In Bulgaria, the estimated remuneration of engineering companies (designers) consists of the cost of work, profits and, where applicable, value added tax (VAT). The cost of design work includes: 1) labor costs, including mandatory contributions, as well as labor costs for managerial, maintenance and administrative personnel; 2) the cost of purchasing and maintaining materials and goods; 3) communications and telecommunications expenses; 4) expenses for rent and maintenance of offices, including water supply, electricity and heating; 5) depreciation of equipment, buildings and software; 6) insurance premiums; 7) expenses for transport and mechanization; 8) travel expenses; 9) expenses for personnel development - training and advanced training of personnel; 10) other costs associated with development.

The total cost of design work in Bulgaria can be determined in several ways: 1) calculation of individual cost elements (calculation); 2) a percentage of the construction cost of the project; 3) calculation based on physical indicators and the complexity of the project; 4) calculation of wages based on hourly rates. The basic rules for calculating prices for design services are set out in the "Methodology for determining the amount of

remuneration for the provision of project services for structural planning and investment design" [61]. In order to avoid dumping prices, it is stipulated that the remuneration cannot be lower than the cost of the performed project services. Engineers who provide design services below cost are subject to disciplinary action by the Board of Architects and Engineers [62]. The project provides for the following stages: – pre-investment research; – conceptual design; – basic design, technical project; – working draft; – author's supervision; – Operation and maintenance projects.

In the structural design section, as in many countries, in Bulgaria, a classification of the complexity and uniqueness of building structures into five categories has been adopted, where category I is the most complex, and category V is the simplest. This eliminates the possibility of not being able to determine the level of prices for design work for special objects in a particular sector, and it is always possible to classify the object into one of five categories. Thus, the fifth (V) category includes statically determined structures with constant loads. The fourth (IV) category includes statically determinate structures without prestressing and composite structures with constant loads, such as warehouses and auxiliary workshops. The third (III) category includes flat and simple spatial structures (including multi-story buildings and tanks) subject to vertical and horizontal loads, without prestressing, without stability tests, load-bearing structures of engineering structures, and others. The second (II) category includes flat and spatial statically indeterminate supporting structures. Considering safety and sustainability: office and residential buildings up to 20 floors, halls with a capacity of up to 2000 people, prestressed tanks and structures made of steel and reinforced concrete, foundations subject to dynamic loads, composite frame systems and towers up to 60m and others. The first (I) category includes the most complex composite prestressed structures, membrane and cable-stayed bridge structures, buildings with more than five levels of basements, vibration isolation foundations, foundations with inclined piles, mooring walls, and so on. The percentage distribution of costs by design stages can be determined from table 16.

Table 16

The cost of the design section by design stages

No.	Design stage	Object complexity category				
		V	IV	III	II	I
1	Conceptual project	10	13	16	19	23
2	Technical project	**80**	**76**	**72**	**68**	**62**
3	Working project, specifications	10	11	12	13	15
5	Total	100	100	100	100	100

(Author's development)

The table shows that the participation of designers is mainly focused on technical design. The cost of the designer's services is determined separately for each part of the project. The services of an architect can be determined in accordance with the methodology of 2007 [61], approved by the Chamber of Architects. In this technique, the influence of the structure and principles of the German experience is noticeable in terms of determining the categories of complexity, classifying objects, and so on.

The relative level of costs for design work in Bulgaria is somewhat lower than in Germany, and ranges from 5.2% to 7.8% in the simplest (I) category and from 8.5% to 17.3% in the most complex (V) categories. Considering that many provisions of the methodology are aimed at anti-dumping measures, it can be concluded that there is a high level of competition in the country and that design enterprises are trying to reduce prices for certain orders.

As for the services of an engineer, the 2008 Methodology of the same name, approved by the United Chamber of Architects and Engineers, can be used to determine the estimated cost of construction work. The methodology of 2008 can be used to determine the cost of structural elements of construction projects, electrical and instrument engineering, engineering systems, technical installations, landscaping, engineering surveys in geology, hydrology and geodesy. Separately, the costs are determined for projects of transport construction, hydraulic structures and irrigation facilities, water supply, water disposal and water treatment, mines and quarries, and reclamation projects. To calculate the cost of the structural part of the construction project, it is necessary to first determine the estimated cost of construction work in accordance with Table 4 of the 2008 Methodology [61]. For structures not listed in the table, the estimated cost of civil works, including excavation, concrete, installation, masonry, insulation, finishing and other basic works, plus 20% of other non-aggregated construction costs, should be added to determine the cost. The cost of implementing a repeat project must be at least 50% of the cost of the original project (40% for the sixth and subsequent applications). The development of additional options is evaluated with a coefficient of 0.5 for each option. Design costs by foreign Bulgarian companies are considered in the 2-x range, costs for reconstruction and refurbishment design in the 1.5-x range and accelerated design in the 1.2-1.5-x range. If costs cannot be determined from the table (e.g. project visualization, technical supervision, overseas project support, repairs, and temporary projects), they should be calculated from labor costs based on hourly cost rates: – experts, supervisors, designers with full legal capacity – 50lv. at one o'clock; – designers with limited legal capacity – 40lv. at one o'clock; – technical workers – 25lv. at one o'clock. Usually there is a minimum cost for such work, for example, the cost of technical and detailed design cannot be less than 4% of the cost of the relevant project, and design briefs - less than 5% and tender documents - less than 10% of the cost of the relevant project or part of it. The profit of design organizations is not standardized, but determined by the terms of the contract.

Conclusions. From the above, we can conclude and highlight the main differences in the design practices of foreign countries. An analysis of design approaches in individual countries in the period up to 2020 shows that there are significant differences. One of the main differences is the wide involvement of stakeholders, including citizens, in the design process, especially at the local level. The practice of participatory design is most developed in England, where residents themselves can lead and order the development of neighborhood plans, and the need to involve citizens in the development of plans at all levels is enshrined as one of the key principles of the National Planning Strategy. Good practice, unique to England, includes "soft landing" procedures aimed at optimizing projects according to user needs and involving them in the control of goals and objectives, technical specifications and estimates. Such procedures are necessary for projects with public participation. In the US, as in the UK, local residents can lead the development of district plans and contribute to similar plans initiated by local authorities. In France and Germany, the district planning procedure requires two stages of public consultation. In Singapore, the high transparency of the city planning system, including the fact that the full set of documents containing interactive city plans is available to the public, ensures public involvement. In Germany, an independent federal foundation, the Baukultur, was created to promote high-quality ideas in architecture and urban planning, including participatory design practices, to the public. Another important difference in practice in the reviewed countries is the widespread use of detailed spatial standards for building parameters, which are included in urban development plans. This allows predictable local development in line with the goals and objectives of the municipality. Compliance with urban planning regulations is often a prerequisite for obtaining a building permit or, in some countries, prior planning permission.

RROs are usually developed for areas of particular importance for urban planning, such as areas undergoing major renovation or redevelopment, historical centers, centers or sub-centers of urban activity, or areas with a high proportion of cultural or business functions. Urban codes can be introduced as part of local (city) plans (UK, France, Singapore) or through district plans (USA, Germany). In all countries, development projects require a convincing justification, which requires a comprehensive analysis of the territory, including historical, cultural, sociological and economic studies and projections of the impact of the project. Such studies and forecasts are also necessary for the preparation of the master plan of the concept paper for the development of the territory. Master plans are not legally defined in any of the countries, but they are widely used, with this function performed by municipalities and developers (UK, France, Germany, Singapore) or detailed district plans (USA). The main difference between the process of architectural and construction design in each country is the development of the concept of the construction object (conceptual design, preliminary design). This concept reflects the main technical, economic, space-planning, other, functional and aesthetic indicators of the designed object. This stage is enshrined in law, either through the Basic Law that regulates urban planning and construction activities, or through mandatory requirements for the development of BIM models of buildings. The development of a project design allows you to document the main characteristics of the project, estimate future design and construction costs, discuss the project with all stakeholders and make any necessary changes at an early stage, avoiding rework costs at a later stage. To analyze the methodology for determining the cost of design work, six national practices were considered: the USA, Great Britain, France, Germany, Singapore and Bulgaria. The analysis was carried out on the basis of materials posted in the public domain, including regulatory documents, guidelines, tender documentation, websites of construction departments, official websites of local and municipal government authorities.

Approaches to determining the cost of construction and installation works (architectural and construction design) for the conclusion of contracts are considered in two ranges. Territorial ranges are documents containing projects for the development of elements of the planning structure of the city. Depending on the type of document adopted in the country, this may be a territorial architectural and urban planning concept, a master plan of the territory, a territorial planning project, and more. The range of development (buildings) is the architectural, functional, technical and constructive solutions for capital construction projects. Depending on the type of document adopted in the country, this may be a draft design, project document, working document, and so on.

In international practice, special attention is paid to assessing the effectiveness and quality of territorial development projects. Evaluation of projects is carried out on the basis of the developed criteria and principles of quality engineering. Projects can be evaluated on a point system. It is necessary to reach a certain minimum in order to obtain approval of the construction plan in the state bodies, and the operational assessment allows you to identify design deficiencies and take them into account in future construction.

This article is directly related to the basics of design, since the proposed solutions can be implemented and will determine the design and construction of buildings and structures in order to preserve the natural world.

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Організація та розвиток процесу проектування у світовій практиці

Процес проектування, або виконання проекту, формально можна розглядати як розробку прототипу або дослідного зразка передбачуваного або можливого об'єкта або його стану. Процес проектування базується на професійних знаннях,

досягненнях науки, техніки, технологічних досягненнях, математичних методах вирішення інженерних завдань, основах мистецтва, економіки, цінової політики, винахідницької діяльності, нормативах, законодавстві та багато іншого. Початок проектування визначається наявністю основних положень про передбачуваний об'єкт та джерела його фінансування. У зв'язку з цим на початок розробки проекту зазвичай проводяться техніко-економічне обґрунтування інвестицій та інші дослідження. Існують відповідні правила відбору проектів, розглядаються тендери та остаточно затверджуються документи. Проектування включає безліч систем, а також знання інженерів - це невід'ємна частина загального інвестиційного процесу, основними учасниками якого є Інвестор, Замовник, будівельне відомство (Підрядник) і проектне підприємство. За кордоном проектування є одним із найважливіших етапів реалізації проектів міського розвитку. Дослідження показали, що близько 15% бюджету проекту витрачається на виправлення помилок проектування, а понад 50% змін проекту пояснюються неякісним проектуванням на ранніх стадіях [1, 2].

У цій статті проведено аналіз процесу проектування в різних зарубіжних країнах, таких як США, Великобританія, Франція, Німеччина, Сінгапур, Болгарія – на основі загальнодоступних матеріалів (нормативні документи, тендерна документація, методичні рекомендації, сайти архітектурних бюро та офіційні сайти регіональних та міських адміністрацій)). Підхід до визначення вартості архітектурного проектування для укладання договорів підряду розглядається у двох діапазонах: 1) діапазон території - документи, що містять проекти забудови елементів планованої структури міста. Архітектурно-містобудівні концепції, залежно від виду документації, ухваленої в країні; 2) діапазон забудови (будівлі) – документ, що визначає проект забудови елементів планованої структури міста, а також архітектурні, функціональні, технічні та конструктивні рішення об'єктів капітального будівництва. Залежно від виду документа, прийнятого країни, може бути ескізним, проектним чи робочим.

Вивчення зарубіжної практики організації процесу архітектурно-будівельного проектування виявило низку принципів, якими можуть керуватися органи влади при забезпеченні високої якості розробки та реалізації проектів міського розвитку.

Ключові слова: ціноутворення, кошторис, вартість будівництва, проектне підприємство, вартість проектних робіт, ринок проектних послуг, процес проектування, попередні проектні роботи, конкурентоспроможність, економічна безпека, діапазон території, діапазон забудови (будівлі).

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