COMPLEX APPROACH TO MANAGEMENT OF INVESTMENT AND CONSTRUCTION PROJECTS IN BIM TECHNOLOGIES.

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https://doi.org/10.5281/zenodo.10461005

Аннотатсия: Статья посвящена возможностям комплексного подхода к управлению инвестиционно-строительными проектами, которые предлагают BIM-технологии как решение некоторых проблем в сфере проектирования и строительства сегодня

Abstract: The article is devoted to the possibilities of an integrated approach to the management of investment and construction projects, which BIM technologies offer as a solution to some problems in the field of design and construction today

Ключевые слова: BIM-технологии, BIM-направление, строительная отрасль, BIM-концепция, инвестиции, проектно-сметная документатsia

Key words: BIM technologies, BIM direction, construction industry, BIM concept, investments, design and estimate documentation

Introduction: There is an increasing trend of BIM technology implementation all over the world, the basis of which is, as a rule, supported by the state. In many countries, the mandatory use of BIM technologies is necessary to obtain a government order, for example, Great Britain, Norway, Finland, Denmark, the Netherlands, etc.

These technologies are also being introduced in Southeast Asia, North America and China. As mentioned above, interest in BIM has increased significantly in Uzbekistan, both at the level of organizations and at the level of the state. Organizations implementing investment and construction projects are trying to implement information technologies with varying degrees of success: from material financial and organizational benefits to large financial and time losses.

This should be viewed with some skepticism based on the belief that BIM technologies can only be afforded by "rich" companies. In fact, if we consider the components of the effectiveness of the implementation of BIM technologies, that is, the possible costs and benefits of this event, then we can estimate as much as possible in advance for mass application, as required by the legislation.

Analysis of the relevant literature. BIM implementation requires a comprehensive approach that includes not just changing the computer program, but also the need to change:

- project technologies;
- organizing the project process;

This is mentioned in the first chapter of this study, which determines the costs of the organization, the inevitable decrease in productivity, etc. It should also be noted that large companies can be advised to make a smooth and consistent transition to BIM, which will

significantly reduce the costs of its implementation (Appendix 2-3 Main costs related to the implementation of BIM).

When talking about the potential benefits of BIM, it is difficult to quantify them directly in kind. Of course, the client may want to get an accurate data model of the building and promise to pay extra for it. In practice, as a rule, the requirement of the information model does not provide for additional payment for this.

The benefit of BIM implementation is cost savings. This will be different for each specific organization. For example, with the help of new technology, you cannot give part of the work to "another party", etc.

By looking at all stages of the life cycle of a real estate object: design - construction - operation - demolition, you can see how savings can come from the implementation of BIM technologies [1].

Projecting. The main advantage of BIM at the project stage is time savings. At first, it is difficult to feel its implementation, taking into account the training of employees, gaining experience, organizing the process, etc., in the future, the working time will be redistributed and less required (Appendix 2-4 Design related to the introduction of BIM technology resupply time).

According to foreign analysis, the project implementation time can be reduced by 20-50%. For example, a study of the effectiveness of the use of BIM technologies by Russian (for example) organizations, conducted by NGSU together with "CONCURATOR" LLC, according to the respondents of the survey, provided information that the project stage can be accelerated by 40%.

Another way to save costs in the implementation of BIM is the opportunity to protect the construction process from design errors: they can be prevented, eliminated or excluded from their appearance on the construction site. In addition, this can even be done during a company's transition to BIM, where the project is done in traditional 2D and a trained employee supervises and tests the model in 3D.

BIM provides significant benefits in the formulation of construction estimates. It is known that making an estimate is a time-consuming and lengthy process. The basis is to calculate the amount of construction work and materials and find prices for them. When using BIM, the data set from the model automatically becomes the task of the surveyor with the surveyor's software. According to Western analysis, this reduces the estimated error by 3%. The main goal of BIM at the state level is the ability to accurately account for and save resources in the implementation of state-funded investment and construction projects.

The results of the survey of experts of several companies show that unplanned costs in the estimate will be reduced up to 3 times, if this is due to a decrease in costs, the cost of the project will be reduced by up to 30%. At the construction stage, labor productivity can increase by up to 30%, the number of "changes" in the construction object can be reduced by up to 90%, etc. Design and operation. Another advantage of BIM is manifested in the model of environmental, energy and economic parameters of the planned real estate with the right combination, proportion and consideration. The main advantage comes from the fact that, not the designer, but who controls the building, including those interested in the implementation of the project or the client, immediately defines the requirements for the designers in BIM [2].

Construction. This is the stage where the benefits of BIM are most evident. Of course, experts have always been involved in improving the efficiency of building construction

organization, but with the advent of BIM, this process has gained new opportunities due to the emergence of the most accurate project, high information of the model and saving construction time.

Armed with a software-equipped tablet, construction inspectors can control the construction process and significantly reduce the number of employees. Checking the accuracy of structures is a separate topic of building construction control. This is where the use of BIM plays an important role.

Information models for the production of construction products and structures are gaining importance even today. The only obstacle here may be the price of the equipment. The operation period of buildings, unlike the construction period, lasts for decades, much longer compared to historical and architectural monuments [3].

Therefore, the correct modeling of the building will bring the greatest benefit to the owner during its operation. This means proper maintenance, resource utilization, and cost accounting.

Usually, the information model of the building is not available for various reasons: either the model is only for construction, or it was developed using old technology, or it was built more than a hundred years ago. In this case, BIM technologies allow it to be recreated on the basis of preserved drawings and studies of buildings. A clear example of this is the information model created many years after the Sydney Opera House was built.

Dismissal and demolition. It is very difficult to quantify the benefits of using BIM here - there are no statistics. This much is clear: in the center of a densely built metropolis or in a complex facility, it is difficult to demolish a building without a data model.

As a main conclusion, we can say that the use of BIM technologies at all stages of the object's life cycle allows you to save money. However, only a comprehensive approach to the introduction of these technologies is really the implementation of investment and construction projects

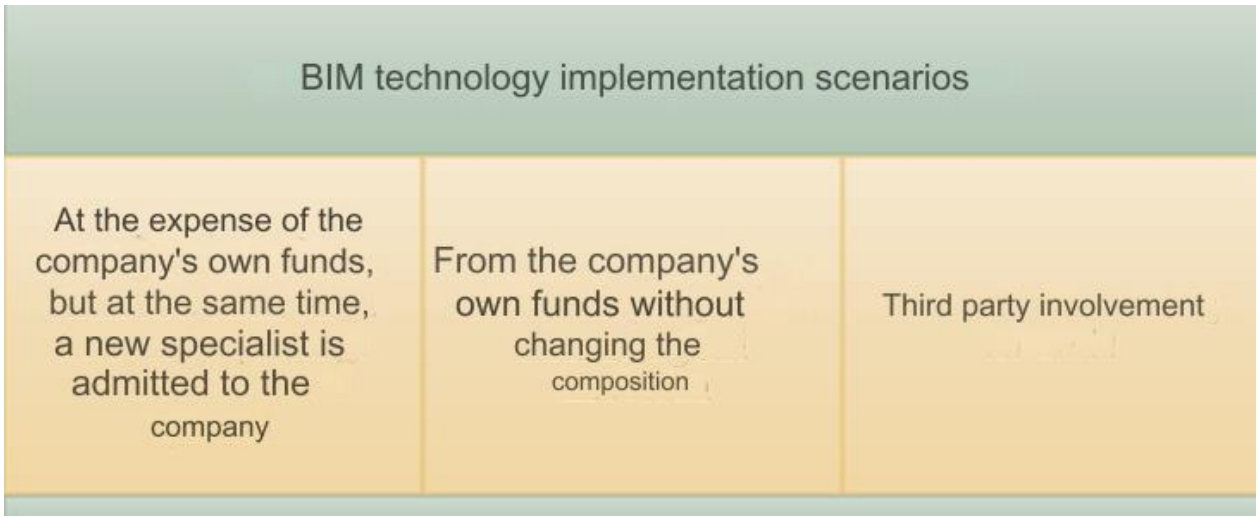

Figure 1. BIM technologies implementation scenarios.

can increase efficiency. The more perfect the information model, whether it is a building or a construction process (depending on the interpretation of logic terms), the greater the cost savings for the investor and the future owner of the building, and the less difficulties there will be for those who design and construct the building.

Several main conclusions can be drawn regarding the possibility of implementing an integrated approach to the implementation of BIM technologies in organizations.

1. BIM technologies save money, the state begins to implement them. The more competent and competent this process is, it is implemented in organizations, the higher its competitiveness in the market of implementation of investment and construction projects.

2. The best result is provided by a comprehensive approach of step-by-step implementation, which interests both investors and future owners of the building. In the process of promoting technologies, the state order plays a big role.

3. It is necessary to reorganize relations between all participants of investment and construction project implementation, work in BIM is beneficial for each of them.

4. BIM should be implemented step by step, starting from the weakest points in the company [4].

Publications generally recommend three scenarios for implementing BIM: independently, with the involvement of a third-party specialist, or by a consulting company.

All three scenarios are related to the implementation of any project technology. Therefore, it is possible to propose another scenario for the introduction of BIM technologies, which implies the separation of a functional unit in the organizational structure of the organization, including specialists for each stage of the project.

A scenario for the introduction of BIM technologies in the organization has been developed, which is based on an integrated approach to this process and, unlike the existing ones, suggests a scenario of separation of a functional unit in an organizational structure that includes specialists for each project stage, Implements the BIM concept, trains employees and organizes workplaces. For development: project schedule; visual details of the project cost; systematization of information about the project of the object itself and all the technical systems installed in the object.

Conclusion: Based on the analysis of opportunities to increase the efficiency of investment and construction project management based on the implementation of BIM technologies, their use allows to significantly improve project management processes, reduce costs and improve the quality of work. BIM technologies make it possible to create a digital model of the object, which can reflect all the details of the project, including information about geometry, materials, design, cost and deadlines. This improves project planning, management and control, reducing the risk of errors and non-compliance with customer requirements. Thus, it is possible to imagine a result with scientific innovation.

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