2. Kovalchick, Ann, Dawson, Kara - Education and Technology: An Encyclopedia. ABC-CLIO - p. 161.- 2004- ISBN 1576073513. Retrieved 21 January 2017.

3. Бабанский, Ю.К. – Оптимизация процесса обучения (Общедидактический аспект) – М., Педагогика, 1977. – 253 с.

4. Верзилин, Н.М., Корсунская, В.М. – Общая методика преодавания биологии. – М., Просвещение, 1976. – 384 с.

5. Осмоловская, И.М. – Наглядные методы обучения. – М., Академия,2009. – 183 с.

УДК 69.05
ББК 38.6-7

THE MAIN ROLES OF BIM TECHNOLOGY IN REDUCING THE OVERALL COSTS OF CONSTRUCTION PROJECTS

M.M.Kashiripoor[1], A.Y. Almaliki[2]

[1] PhD of Architecture, Associate Professor, Department of «Building Materials and Construction Technology»

[2] PhD researcher, civil engineering faculty

Belarusian National Technical University

Minsk, Republic of Belarus

Emerging in the recent past is Building Information Modeling technology and promising to change the entire industry into cost, efficiency, and optimization of project management in the construction industry. This article outlines how the application of BIM technology in building large and complex projects can play an important role in reduction of soaring costs in construction. Computer software in BIM integrates engineering construction information and services. BIM provides scope for easier execution of projects, optimum utilization of resources, and better implementation of multidisciplinary team approach. In the study conducted, some challenges of using BIM towards cost management include standardization of software integration lacking in some countries. BIM optimizes reduction of action changes above the budget and improves the design quality. These findings shed light on the necessity of adopting BIM technologies for the economic and technical improvements within the construction industry in view of the increasing pace of urbanization and growing complexity in projects.

Keywords: construction, lean, waterfall and critical path methodology, project management methodologies

Introduction. The development of the domestic economy and the progress of science and technology have promoted the pace of urbanization and the scale of construction. In recent years, the rapid progress and speed of urbanization in my country has led to the gradual emergence of an important development trend: the management of engineering cost information [1]. This development trend aims to achieve diversification, optimization and management of engineering

construction at this stage. The rapid development of government investment projects, the real estate market and other construction engineering markets has led to an expansion in the economic scale of construction engineering in the country For projects characterized by large-scale, complex structures and significant structural importance, it has become challenging to achieve comprehensive enhancement of economic benefits and technical indicators through conventional engineering management methodologies where In light of these developments, Building Information Modeling (BIM) technology, which integrates engineering construction information and computer technology, has emerged as a progressive solution [2]. This technology, formally known as Building Information Modeling (BIM), has emerged as a pivotal element in this transformation. This technology has emerged as an indispensable element in the evolution of the construction industry, offering a comprehensive range of applications and contributing significantly to the success of construction projects throughout their entire lifecycle. Construction companies leverage BIM technology in their management processes, thereby enhancing their own construction technology and facilitating the streamlined execution of projects [3].

The advent of Building Information Modelling (BIM) technology has precipitated a paradigm shift within the construction industry, signifying a substantial milestone [4]. The implementation of BIM technology in the construction industry of my country has yielded substantial benefits, including the reduction of time spent on cost estimation and the enhancement of efficiency. Moreover, it has led to the elimination of unbudgeted changes. Recent policy directives and the promotion of engineering technology have led to a steady standardization and normalization of BIM technology within the country [5]. A substantial corpus of theoretical studies has demonstrated that the implementation of BIM technology in cost management of engineering projects can enhance resource utilization, mitigate the issue of escalated engineering costs due to unanticipated issues during the construction process, curtail ineffective work and resource consumption, and furnish a convenient information communication platform for participants in various engineering projects [6]. Concurrently, it has been demonstrated to be an effective measure in mitigating collision problems arising from interdisciplinary collaboration, thereby averting the wastage of resources and costs concomitant with such occurrences. A review of the current application of BIM technology in the cost management of engineering projects in Iraq reveals that the construction of relevant models, the degree of standardizations, and software integration in Iraq are not sufficiently unified. Furthermore, the control of the project's preliminary cost estimation, budget estimate, and budget limit is inadequate, and the cost management advantages of BIM technology have not been fully realized [7].

Building Information Modeling (BIM) has undergone continuous development over the past few decades and has been extensively promoted and applied in both developed and developing countries worldwide. In my country, real es-

tate companies, design agencies, and professional organisations have progressively initiated the implementation of BIM technology in construction projects [8].

The integration of BIM with change control systems has emerged as a pivotal approach for the management of design changes. A change management process and control system for managing changes in detailed design projects were introduced, and the results of using BIM technology were evaluated to identify changes. By collecting data on actual projects and changes in the projects change control system, it was ultimately concluded that dynamic changes to the change control system combined with BIM technology can reduce design changes [9] built a BIM construction collaboration platform for engineering projects and studied the feasibility of BIM technology in engineering cost management.

The application of BIM technology in the architectural design industry has the potential to enhance the efficiency and scientific rigour of building structure models, thereby improving the design quality of construction projects and enhancing construction safety and efficiency.

Developed countries have been the cradle of the three industrial revolutions. The construction sectors in these countries are relatively mature, and research on controlling construction project costs has already begun. Notable research findings include value engineering theory, total cost management theory, and target cost management theory. Following the establishment of a socialist market economy in the country under discussion, a set of unified management mechanisms has gradually been established in the construction industry, with construction cost management being of particular importance for the management of construction companies [10].

RESULTS AND DISCUSSION

The BIM technology is revolutionizing the construction industry. This article describes how BIM plays a vital role in reducing costs during building, making project management efficient, and handling the challenges of large and complex projects [11]. The primary feature of BIM tells about integration and management of engineering construction information for directed decisions-making among stakeholders during the entire period of the project. Well, along with these advantages, BIM offers a complete digital projection of the project for managing architects, engineers, and contractors while minimizing errors as well as reworks. The savings in time and cost applicability are the benefits. In cost management, the BIM application has been especially useful in managing unanticipated issues at high escalation rates. Using BIM, construction organizations can pinpoint potential conflicts and inefficiency early in the design phase and make adjustments before involving resources unnecessarily. BIM also provides a centralized hub for communication channeling for project participants and ensures that all parties understand the project's objectives [12].

The adoption of BIM is not without its problems Cost management benefits from BIMS are yet to be realized maximally in Iraq, for example, because of lack of standardization and software integration. Preliminary cost estimation, budget estimates and budget limits are quite insufficient in several cases. Attempts to address the challenges will require unified efforts toward developing a common reference point for standards and propagating the integration of BIM in existing practices of construction management. The merger of BIM with change control systems signifies a desirable prospect for managing design changes and reducing their cost impact on projects. By updating the change control system dynamically with BIM data, it minimizes disturbance to the project schedule by construction companies. Generally, BIM is the solution for all problems related to cost management in construction. Besides improving utilization and fostering collaboration, BIM is considered in excellent light since it minimizes unbudgeted changes. With these, every modern construction project requires BIM, as the industry will consider and embrace it all the more so since the future lies in even more growing complexity and competition [13].

In brief-the-findings This study finds that BIM technology has a significant contribution towards cost reduction in construction projects because it enhances resources utilization, improves collaboration, and minimizes unforeseen changes. The important findings were: 1. An efficacious cost management tool: BIM involves getting potential conflicts identified early and reducing expensive rework; 2. Improved collaboration: A centralized communication system among stakeholders makes BIM; 3. Implementation challenges-Full-fledged potential of BIM is lost in some places because of lack of standardization and software integration; 4. Change Management: Through the conversion of BIM with intra-project change control systems, design changes and their costs become lower. These findings further emphasize the need for adoption of BIM technology for the efficient project management in the construction industry within cost-effective measures.

CONCLUSION

For construction management companies themselves, the use of dynamic data processing, analysis, and information exchange based on an advanced BIM technology platform can effectively address many practical management problems, such as the disruption of construction project cost control management processes and the significant decline in work process efficiency in a short period of time. This can promote the transformation and upgrading of construction companies, and implement more comprehensive, scientific, effective, and accurate construction project cost control. This paper first systematically and in-depthly discusses current problems in cost management and, based on these problems, proposes specific solutions for using new BIM technology to address these problems. It also examines and explores the specific applications of BIM technology in current cost management and other work processes in construction engineering projects in my country. The following are conclusions and insights.

REFERENCES

1. Codinhoto, R.; Kiviniemi, A. BIM for FM: A Case Support for Business Life Cycle. In Proceedings of the IFIP International Conference on Product Lifecycle Management, Yokohama, Japan, 7–9 July 2014. [Google Scholar] [CrossRef]

2. Jaaron, A.A.M.; Hijazi, I.H.; Musleh, K.I.Y. A Conceptual Model for Adoption of BIM in Construction Projects: ADKAR as an Integrative Model of Change Management. Technol. Anal. Strateg. Manag. 2022, 34, 655–667. [Google Scholar] [CrossRef]

3. Muller, M.F.; Esmanioto, F.; Huber, N.; Loures, E.R.; Canciglieri, O. A Systematic Literature Review of Interoperability in the Green Building Information Modeling Lifecycle. J. Clean. Prod. 2019, 223, 397–412. [Google Scholar] [CrossRef]

4. Kashiripur, M.M. and Al-Sayyab, A.A., Proper methodology for automated monitoring during construction. Nauka–obrazovaniju, proizvodstvu i jekonomike»: sb. materialov studencheskoj nauchno-tehnicheskoj konferencii v ramkah, 20, pp.84-88.

5. Georgiadou, M.C. An Overview of Benefits and Challenges of Building Information Modelling (BIM) Adoption in UK Residential Projects. Constr. Innov. 2019, 19, 298–320. [Google Scholar] [CrossRef]

6. Waqar, A.; Othman, I.; Shafiq, N.; Mansoor, M.S. Applications of AI in Oil and Gas Projects towards Sustainable Development: A Systematic Literature Review. Artif. Intell. Rev. 2023. [Google Scholar] [CrossRef]

7. Kaewunruen, S.; Lian, Q. Digital twin aided sustainability-based lifecycle management for railway turnout systems. J. Clean. Prod. 2019, 228, 1537–1551. [Google Scholar] [CrossRef]

8. Kashiripoor M.M. Fourth wave technologies in construction and architecture: from idea to realization (part 2) // Urban construction and architecture. - 2024. - Vol. 14. - N. 3. - P. 178-193. doi: 10.17673/Vestnik.2024.03.22

9. Sun, Y.H.; Wang, J.; Wu, J.; Shi, W.X.; Ji, D.Z.; Wang, X.Y.; Zhao, X.Z. Constraints Hindering the Development of High-Rise Modular Buildings. Appl. Sci.-Basel 2020, 10, 7159. [Google Scholar] [CrossRef]

10. Kashiripoor M.M. Fourth wave technologies in construction and architecture: from idea to realization (part 3: Sample applications of the fourth wave technology in construction and architecture) // Urban construction and architecture. - 2024. - Vol. 14. - N. 4. - P. 171-179. doi: 10.17673/Vestnik.2024.04.24

11. Lu, W.S.; Fung, A.; Peng, Y.; Liang, C.; Rowlinson, S. Cost-benefit analysis of Building Information Modeling implementation in building projects through demystification of time-effort distribution curves. Build. Environ. 2014, 82, 317–327. [Google Scholar] [CrossRef]

12. Bryde, D.; Broquetas, M.; Volm, J.M. The project benefits of Building Information Modelling (BIM). Int. J. Proj. Manag. 2013, 31, 971–980. [Google Scholar] [CrossRef]

УДК 72.04.017

APPLICATION OF RAMIE FABRIC IN INTERIOR DESIGN

[1]Fuqin Zhang, [2]Xianpeng Wang, ✉A.B.Мазаник
[1, 2, ✉]Belarusian national technical university,
Republic of Belarus, Minsk

Abstract: With the development of economy and society and the diversification of decoration styles, people's demand for fabrics has also shifted from basic functions to spiritual levels. Therefore, people also pursue the spiritual value contained in traditional textiles when using them. In interior soft decoration design, the use of ramie fabrics can enhance the visual effect and artistic atmosphere of the space environment, and show the unique regional culture and traditional craft characteristics. Therefore, it has a high application value in interior soft decoration design. Innovative design of ramie fabrics can not only attract young customer groups and increase the popularity of ramie fabrics, but also fully explore the economic value and cultural value of ramie fabrics, so that more people will choose ramie fabrics in interior soft decoration design styles.

Keywords: *ramie; comfort; interior design; sustainability; nature.*

Introduction. Ramie fabric is a textile made from natural fibers such as hemp and ramie, using plant dyeing, weaving techniques and pattern design. Ramie fabric has the characteristics of being breathable, fast in heat dissipation and easy to wash, and can be used to make a variety of clothing and furniture, such as bedding, clothing and other household items [1] .

ramie fabrics : dyeing and weaving. Dyeing is to add natural dyes to the fabric pulp for dyeing; while weaving is to use plant fibers to form corresponding patterns or designs through crocheting, sewing, etc. during weaving, and then after washing and other treatments, a textile with decorative effects is formed. For example, double-stranded hemp or ramie, which are often used in ramie fabrics , are natural plant dyes, so they can be dyed. Since ramie fabrics are woven with natural materials, they have good air permeability and heat dissipation properties, so they are suitable as decorative fabrics used in interior soft furnishings. After dyeing and weaving, ramie fabrics also have good wrinkle resistance, so they can be used to make daily necessities such as sofa covers and pillowcases [2-3] .

ramie fabrics in interior decoration design, the material should be selected according to the room layout, furniture characteristics and overall style. In order to make the interior decoration design more beautiful, the color and style of the ramie fabric should be determined according to the color of the room, the design of the mixed space, and the style of the furniture. The appropriate ramie fabric