© Volume 2, Issue 8, ***August*** 2026 | JATIR
ISSN: 3139-8464 (p)

Emerging New Technologies in Construction and Management

Ar. Devashree Sunil Gabhane
D.Y. Patil College of Architecture, M. Arch, Savitribai Phule Pune University, Pune, India

***Abstract*—The immense impact made by innovative technologies has been realized in numerous industries globally. The construction industry is, without doubt, lagging concerning the utilization of technologies. Therefore, the study tries to explore different emerging technologies in the construction industry, with the identification of challenges and strategies by different stakeholders in its use.**

The study will used a pragmatism research philosophy together with a qualitative research strategy in determining emerging technologies in the construction industry while noticing stakeholder challenges and strategies. The analysis will be done with descriptive statistics using mean score ranking and a one-sample t-test. Findings - Each emerging technology challenge will analysed and compared to see how pressing the challenges were as well as the aligned strategies. A key indication of the study is that the familiarity of the various emerging technologies was based on how many occasions one had an encounter with the technology. Practical implications - The discussion's findings contribute to a better knowledge to construction stakeholders on the challenges and strategies for rising technology adoption and implementation competencies. Originality/value - The study reckoned stakeholders' challenges on the emerging technologies in the construction industry context and recommended strategies to balloon the adoption of these emerging technologies in a developing country setting.

***Index Terms*—Emerging Technologies, Construction Management, Technology**

I. INTRODUCTION

Technology keeps changing our lives all the time. Earlier, construction managers used paper files and manual methods to manage workers, costs, and project schedules. Most work was done by hand, which took more time and effort. Slowly, new tools like power tools and heavy machines were introduced. These helped workers complete tasks faster and made construction sites safer.

The construction industry was once known for being slow in using new technology. However, this has changed in recent years. Today, construction managers use both technology and traditional construction knowledge. Big construction companies started using new technologies earlier, and now many others are also adopting them. This is the best time for the construction industry to use modern technology.

In the last ten years, the construction field has grown very quickly. Many construction companies now use cloud-based software for project management and data analysis. These tools help in planning, monitoring, and controlling projects more effectively. Technology allows managers and workers to get real-time information from the site, which helps them take quick and better decisions. As a result, construction projects are completed more efficiently and with better quality.

II. AIM

The aim of this research is to understand how new and emerging technologies are being used in the construction industry and how they help improve work efficiency, safety, and project management.

III. OBJECTIVE

- To study different emerging technologies used in the construction industry.
- To understand how these technologies improve construction work, safety, and productivity.
- To identify the benefits of using modern technology in construction projects.
- To understand the challenges faced while adopting new technologies in construction.

IV. RESEARCH METHODOLOGY

This research is based on a descriptive and qualitative research approach. The study mainly uses secondary data to understand the role and impact of emerging technologies in the construction industry.

The data for this research is collected from existing sources such as:

- Research papers and journals
- Published articles and reports
- Books related to construction technology
- Trusted websites and industry reports

V. LITERATURE REVIEW

A literature review method is used to study various emerging technologies such as Artificial Intelligence (AI), Building Information Modelling (BIM), drones, Internet of Things (IoT), 3D

printing, robotics, blockchain, cloud computing, and virtual reality, and their applications in the construction industry.

a) Artificial Intelligence (AI)

Artificial Intelligence is making construction work safer, faster, and more efficient. It is used for project planning, scheduling, and resource management, which helps reduce time and cost. Machine Learning enables systems to learn from data and support better decision-making. AI also improves site safety, reduces errors, and speeds up project completion. Generative AI helps architects and engineers create better designs, use materials wisely, and plan sustainable projects.

b) Robotic Automation

Robotic automation is changing construction sites by using robots for tasks such as bricklaying, material handling, demolition, and 3D printing. Robots reduce manual labour, lower the risk of injuries, and increase work speed and accuracy. Automation also helps overcome labour shortages by handling repetitive tasks. Although costly, robotics improves productivity, safety, and efficiency and will play an important role in the future of construction.

c) Drones

Drones, also called unmanned aerial vehicles (UAVs), are widely used on construction sites today. They help in site surveying, inspection, and monitoring by capturing aerial photos and videos. Drones allow managers to track progress, create maps, and inspect hard-to-reach areas like tall buildings and bridges safely. They improve safety by reducing the need for workers to climb dangerous heights and make data collection faster and more accurate.

d) Internet of Things (IoT)

The Internet of Things (IoT) connects machines, tools, and materials on construction sites through sensors and smart devices. These devices provide real-time information about performance, safety, and usage. IoT helps improve site management, efficiency, and safety. It also supports the development of smart buildings that offer better comfort and a more personalized experience for users.

e) 3D Printing

3D printing is becoming an important technology in the construction industry, especially for printing concrete structures. It allows buildings to be made faster and in different shapes using materials like concrete and composites. 3D printing reduces labour and material waste by producing components directly on-site. Although large 3D printers are expensive, this technology saves time, lowers costs, and supports creative and customized building designs.

f) Blockchain

Blockchain is a digital system that securely records all project data and transactions in the form of connected records. In construction, it helps track costs, materials, and project progress accurately.

Blockchain improves transparency, reduces errors, and increases data security. Its decentralized nature makes it reliable and useful for managing construction projects of any size.

g) Cybersecurity

As construction work becomes more digital, protecting data has become very important. Cybersecurity helps keep project information, designs, and systems safe from cyber threats. Construction companies now use strong security measures like data encryption and threat detection to protect sensitive information and ensure smooth project operations.

h) Building Information Modelling (BIM)

Building Information Modelling (BIM) is a modern technology that improves accuracy and coordination in construction projects. It allows architects, engineers, and contractors to work together on a single digital model of a building. BIM helps reduce errors, improve planning, and solve design problems early. It also makes information sharing easier and has been successfully used in major projects like the Shanghai Tower.

i) Cloud Technology

Cloud technology allows construction companies to store large amounts of data online and access it anytime from anywhere. It helps project managers share information quickly and keep data secure in one place. Cloud-based tools improve coordination between different teams and make collaboration easier, especially on large construction projects.

Benefits of Emerging new Technologies

Emerging technologies are helping the construction industry reduce delays, control costs, solve labour shortages, and improve safety.

These technologies increase efficiency and productivity throughout the construction process.

- Automation: Technology automates tasks like payroll and calculations, reducing errors and saving time. Workers are paid correctly and on time.
- Increased Productivity: Software automates routine work, helping projects finish faster.
- Attracting New Talent: Technologies like AI, robotics, and 3D printing make construction jobs more attractive to young, tech-skilled workers.
- Higher Efficiency: Modern tools reduce manual work and allow workers to focus on skilled tasks.
- Self-Healing Concrete: Special concrete can repair small cracks on its own, making roads and bridges last longer.
- Better Collaboration: Digital platforms store all project information in one place, improving teamwork.
- Cost Savings: AI helps predict costs and reduce waste, improving budget control.
- Real-Time Data: Technology provides live information on project progress and worker performance, helping managers make better decisions.

- Improved Safety: Modern construction technologies improve site safety by reducing risks and preventing accidents.

Challenges faced by Stakeholders

- High Costs: While new technologies reduce labour and injury costs, they are expensive to buy and maintain. Costs include software, equipment, skilled workers, training, and regular updates. For example, 3D printers are costly and require continuous monitoring and maintenance.
- Interoperability Issues: Different systems like BIM, AR, and VR often do not work well together, making data sharing and updates difficult.
- Cloud Access Problems: Cloud-based tools need a strong and continuous internet connection. Poor network connectivity on construction sites limits the effective use of cloud technology.
- Resistance to Change: Many construction professionals are slow to accept new technologies, which reduces productivity and delays adoption.
- Privacy and Data Security: As more data is stored digitally, protecting client and project information has become a major concern.
- Collaboration Issues: Even with advanced tools, proper coordination between teams remains difficult without proper training and systems.
- Sustainability Concerns: Using eco-friendly materials and energy-efficient methods is challenging due to high costs and limited awareness.
- Labor Shortages: Lack of skilled workers increases the need for technology, but training workers to use new tools takes time and effort.

VI. RESULT

The study shows that emerging technologies are significantly transforming the construction industry. The findings indicate that technologies such as Artificial Intelligence (AI), robotics, drones, BIM, IoT, 3D printing, blockchain, and cloud computing are improving project planning, execution, and management.

The results reveal that:

- The use of AI and automation has improved project scheduling, reduced errors, and increased overall efficiency.
- Drones and IoT have enhanced site monitoring, safety inspections, and real-time data collection.
- BIM and cloud technology have improved collaboration among architects, engineers, and contractors by allowing them to work on a shared digital platform.
- 3D printing has reduced construction time, material waste, and labor dependency.
- Robotics and wearables have improved worker safety and productivity.
- Blockchain and cybersecurity tools have increased data transparency, security, and trust in construction transactions.

Overall, the adoption of these technologies has resulted in better productivity, improved safety, cost savings, and faster project completion across construction projects.

VII. DISCUSSION

The discussion highlights that while the benefits of emerging technologies are clear, their adoption is not without challenges. High initial costs, lack of skilled workers, resistance to change, and technical integration issues slow down widespread implementation. Poor internet connectivity also affects the effective use of cloud-based systems.

However, the long-term advantages outweigh these challenges. As professionals become more technology-friendly and training improves, adoption rates are expected to rise. The study confirms that emerging technologies play a crucial role in making construction smarter, safer, and more sustainable.

VIII. CONCLUSION

The idea that the construction industry is slow in adopting technology is no longer true. Modern technologies have improved the role of construction managers and made projects more efficient, safe, and productive. By using new technologies, construction companies can save time and money, reduce waste, and achieve better project results.

Although some technologies are still developing, they have great potential to change the future of construction. Technology and innovation will continue to play a major role in how buildings are designed and constructed.

REFERENCES

[1] "Seven coolest construction technologies in 2023," *Viewpoint*. Accessed: Aug. 4, 2026. [Online]. Available: https://www.viewpoint.com/blog/seven-coolest-construction-technology-2023 (Library)

[2] "5 emerging technologies in the construction industry," World Construction Today. Accessed: Aug. 4, 2026. [Online]. Available: https://www.worldconstructiontoday.com/news/5-emerging-technologies-in-the-construction-industry/ (Library)

[3] "Top technology trends," Simplilearn. Accessed: Aug. 4, 2026. [Online]. Available: https://www.simplilearn.com/top-technology-trends-and-jobs-article (Library)

[4] "Construction technology," OpenAsset. Accessed: Aug. 4, 2026. [Online]. Available: https://openasset.com/blog/construction-technology/ (Library)

[5] "How emerging construction industry technology is shaping the future," eBacon. Accessed: Aug. 4, 2026. [Online]. Available: https://www.ebacon.com/business-tips/how-emerging-construction-industry-technology-is-shaping-the-future/ (Library)