Te c h n o v a si a IA M In t e r n a t i o n a l
Jo u r n a l ⓒ 20 2 5 Volume **1**, Number **2**, May **2025** pp. **1–16**

Systematic Literature Review: Asset Management System for Educational Institutions

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Received February 2025; accepted April 2025

ABSTRACT.
Educational institutions will increasingly rely on asset management (for optimizing operational efficiency, and managing resources to meet sustainability targets). This study attempts to fill a literature gap on asset management in academia, with a specific focus on digital tools, financial strategies, legacy system integration, sustainability metrics in academia, and existing gaps in academic research. We applied the Systematic Literature Review (SLR) method to 33 papers from 2017 to 2024. The results suggest that asset tracking and management is considerably improved through technologies such as Building Information Modeling (BIM), Internet of Things (IoT), and the Digital Twin. However, giant challenges remain, including the integration of new systems with existing legacy infrastructure, cost constraints in implementation, and regulatory obstacles that hinder the adoption of emergent technologies like blockchain. These financial strategies consist of wealth management services and using Business Intelligence (BI) tools to manage resource allocation in educational institutions. Although sustainability metrics kind of integrated into asset management models have the potential to enhance efficiency, minimize environmental harm, there're a limited take up of assets by the usage as the charges are too excessive and standards aren't properly defined. This paper also identifies gaps in the current literature, namely the need for a framework that is relevant for educational practitioners, and calls for more specific empirical studies on the impact of the implementation of digital technology. These findings underscore the need for additional research to overcome existing challenges and find practical solutions to address asset management in educational institutions.

Keywords: SLR, Asset Management, BIM, IoT, Sustainability, Educational Institutions

1. Introduction.

Asset management has become an essential function for educational institutions, encompassing the systematic planning, acquisition, operation, and maintenance of various physical assets. These assets include property buildings, laboratory equipment, IT infrastructure, and library collections. Effective asset management is critical for educational institutions (universities and colleges) as it ensures optimal resource utilization, reduces operational costs, and improves the overall quality of education [1-2]. However, managing these assets effectively presents significant challenges due to their diversity, operations scale, and educational institutions' evolving needs [3].

1.1. The Growing Need for Digital Transformation.

To tackle these challenges, many educational institutions have started leveraging advanced digital tools and technologies for improved asset management practices. Building Information Modeling (BIM) enables more detailed visible modeling of buildings and efficient campus planning, while Geographic Information Systems (GIS) provides spatial information/existing conditions data for facilities and infrastructure [4-5]. With the implementation of Internet of Things (IoT) sensors, performing real-time monitoring of assets leads to predictive maintenance and better decision making [6-7]. Furthermore, blockchain infrastructure has been presented as a means for secure asset

transactions and transparent record keeping, although its application in the educational context remains limited as yet [8].

Because these tools can be seen as advanced technologies, their role in education is getting a lot of interest, but they do have some impediments to being used in classrooms. Legacy systems are the point of many academic institutions, resulting in a challenge for integrating new technologies like BIM, GIS, IoT, etc. Moreover, a limited budget often restricts an institution's ability to invest in an exhaustive asset management solution [9-10]. Adoption of emerging technologies is further complicated by regulatory and compliance issues, especially in government- owned educational institutions [11]. These challenges demonstrate the importance of an asset management approach that is customized to the unique requirements and limitations of academic institutions. The first stage was a review of the existing literature identify the gap in research regarding the asset management framework that focuses on the educational institution. Although there has been much discussion around how the use of digital tools like BIM and GIS can be implemented in the industrial and commercial sectors, little has been done regarding implementation plans specifically focused towards higher education [12–14].

Additionally, the practicality of several proposed frameworks is challenging to evaluate, given their theoretical nature and absence of empirical validation [15]. While energy efficiency and energy efficiency standards for green buildings in the education sector have drawn increasing attention, not much work has been done on sustainability metrics for asset management practices [16].

1.2. Research purposes. This SLR study aims to address the gaps identified by analyzing 33 peer-reviewed papers on asset management practices in educational institutions. The specific objectives of this review are as follows:

1. This report provides a comprehensive overview of asset management practices in educational environments, focusing on using digital tools and methodologies [17].
2. Identifying key themes, technologies, and challenges reported in the literature, with particular emphasis on issues related to digital integration, financial planning, and sustainability [18-19].
3. Proposes a conceptual framework designed for the needs of educational institutions, incorporating strategies for digital transformation, predictive maintenance, and sustainability matrices [20].

1.3. Research Questions. To guide this review, the following research questions have been defined.

- **RQ1**: What are the leading digital tools and technologies used for asset management in educational institutions?
- **RQ2**: How are these digital tools integrated with existing legacy systems in educational institutions?
- **RQ3**: What financial strategies are used to optimize asset management in educational institutions?
- **RQ4**: How is the sustainability matrix integrated into asset management practices in educational institutions?
- **RQ5**: What are the key challenges and gaps in current research on asset management frameworks for educational environments?

This systematic literature review addresses these research questions to enrich the current body of knowledge and offer a comprehensive understanding of the challenges and opportunities in asset management for educational institutions. The results are anticipated to provide valuable insights for policymakers, facility managers, and researchers, paving the way for more effective, data-driven, and sustainable asset management practices in the education sector.

2. Methodology.

2.1. Research Design. This study uses the selected SLR methodology to comprehensively synthesize existing research on asset management practices in educational institutions. The SLR approach is well suited to this topic as it allows for a structured and systematic literature review, thereby identifying key themes, technologies, and research gaps [1-2]. The review focuses on integrating digital tools, financial planning strategies, and sustainability considerations within an asset management framework tailored for the educational context.

2.2. Data collection.

Search Strategy. The data collection involved systematically searching relevant academic databases, including Scopus, IEEE Xplore, Google Scholar, and Web of Science. The search was conducted using keywords related to asset management and educational institutions. The main keywords used included:“Asset management in universities”;“Digital tools for asset management in education”;“BIM in educational asset management”;“GIS for campus planning”;“Blockchain in asset tracking”;“Sustainability in educational asset management”

The search focused on articles published between 2010 and 2024 to ensure the review encompasses the latest developments and emerging trends in digital asset management tools. To uphold the quality and reliability of the data sources, only trustworthy peer-reviewed journal articles, conference papers, and industry reports were included [3].

2.2.1. Inclusion and Exclusion Criteria. The inclusion criteria are as follows:

- Focus on asset management practices in educational institutions (e.g., universities, colleges).
- Discusses using digital tools such as BIM, GIS, IoT, and blockchain in asset management.
- Empirical studies, case studies, or theoretical papers published in peer-reviewed journals or conferences.

- Integration of financial planning and sustainability strategies within an asset management framework.

The exclusion criteria are as follows:

- Studies focusing solely on industrial or commercial sector asset management are irrelevant to education.
- Articles published before 2010 may not reflect the latest developments in digital

  technology.
- Non-peer-reviewed articles, opinions, and editorials.

A total of 75 articles were initially identified through database searches. After applying inclusion and exclusion criteria and screening titles and abstracts, 33 papers were selected for final analysis.

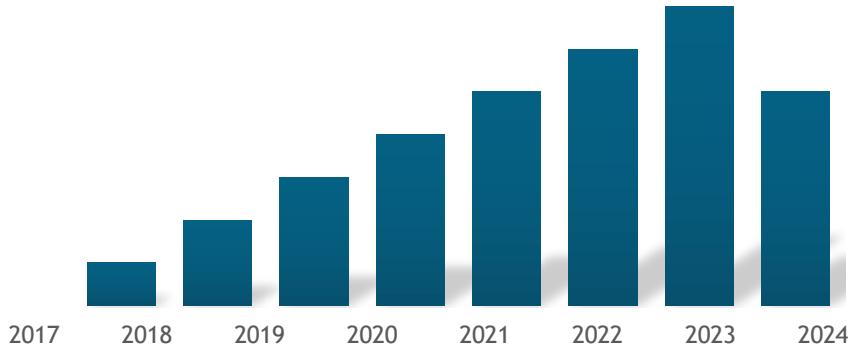

FIGURE 1. Graph of asset management paper publications

2.3. Data Extraction and Analysis.

Data Extraction Process. A thorough review of selected papers was conducted to extract relevant information using a standard data extraction form. Key data extracted from each paper included: (1) title and year of publication; (2) research focus and objectives; (3) methodologies and technologies used (e.g., BIM, GIS, IoT, blockchain); (4) main findings and contributions; (5) identified research challenges or gaps.

To minimize bias and have accuracy in extracted data, we had two reviewers independently conduct the data extraction process. Any disagreements between the reviewers were resolved through discussion and consensus [4].

2.4 Thematic Analysis.

The extracted data were coded and themed into key themes including the following: (1) Digitalization: utilize cutting-edge digital tools (e.g. BIM, GIS, and IoT technologies) for the visualization of assets, their monitoring, and decision support; (2) Financial optimization: connecting asset management with financial planning tactics to enhance resource distribution; (3) Integrating sustainability: including green building systems and sustainability performance metrics in an asset management system; (4) Key challenges and

gaps in research include lack of identification of barriers to technology adoption; issues pertaining to data interoperability; and a lack in empirical validation.

2.5 Framework Development.

As a result of the thematic analysis: synthesis of findings a conceptual framework was generated for asset management of educational institutions. The literature identificated some key components that we considered for the proposed framework, which are: (1) Data integration layer: BIM, GIS and ERP systems for integrated data capturing and analysis; (2) Predictive maintenance module : IoT sensors and AI-based analytics for real-time asset performance monitoring; (3) Financial cluster: A financial planning module that incorporates personal wealth management strategies and budgeting techniques specific to the educational context; (4) Sustainability matrix: Using metrics of energy efficiency, green building practices and long-term resource planning; (5) This is a framework created for the needs of educational institutions. It provides integrated solutions for digital transformation, financial optimization and sustainability, and offers a holistic, multi-disciplinary approach.

2.6 Validity and Reliability.

A series of measures were taken to make the review as valid and reliable as possible: (1) Extensive search strategy: Utilization of numerous academic databases and search terms to include all pertinent studies; (2) Multiple-review process, with 2 different researchers independently reviewing and extracting data: this was done to minimize bias; (3) Well-defined inclusion criteria: Well-defined inclusion and exclusion criteria ensures that only relevant and high quality studies are included; (4) Cross-verification: The thematic analysis findings were cross-verified with the original study to ensure their accuracy and consistency.

3. Results and Discussion.

3.1. **RQ1: What digital tools and technologies are the most used for asset management in educational institutions?**

The major mentioned digital tools and technologies for asset management in educational institutions are BIM, GIS, IoT and Blockchain as discovered both from systematic reviews of 33 selected papers.

Researches like “Digital System Model for Asset Management in Thai Universities” shows the significant role of BIM in preparing high-detailed 3D models to formulate a framework for maintenance and renovation projects [13]. Campus facilities are mapped and subject to spatial analysis using GIS. An example is the study "Supporting Asset Management with GIS and Business Intelligence Technologies" displaying how University of Turin uses GIS to manage outdoor facilities while impacting resource allocation and cost efficiency [26].

IoT is increasingly used to monitor asset performance in real time, enabling predictive maintenance strategies. In the study “Development of Geospatial Asset Management System for Higher Education,” IoT integration with asset management systems was shown to reduce downtime and optimize the use of laboratory equipment [11]. Although less commonly

implemented, blockchain is emerging as a promising tool for secure asset transactions and transparent record-keeping. The study "Blockchain Application in University Asset Management" highlights the potential use of blockchain to enhance data security and reduce fraud in asset tracking [28].

Overall, the findings show an increasing trend of adopting advanced digital tools, with BIM, GIS, IoT, and blockchain being the most frequently used digital tools in asset management applications. The following is a table of articles examining the use of digital tools and technologies in asset management applications.

TABLE 1. Articles related to the use of digital tools and technologies in asset management

Article	Method	Key finding	Gap
[1]	IDEF0 Modeling, SWOT Analysis, AHP	Develop a comprehensive AM framework for university assets, emphasizing structured planning.	Research is limited on asset management in universities, especially in developing countries.
[6]	RAMS, PHM, Statistical Modeling	Digital transformation improves asset lifecycle management through Industry 4.0 technologies.	The complexity of integrating various Industry 4.0 technologies into asset management processes.
[7]	Risk Assessment, Comparison of Rating Systems	Integration of GIS and BI tools improves data visualization and decision making in university asset management.	Data integration and interoperability issues between GIS and BIM.
[11]	Geospatial System Design, Data Integration	Integration of digital twins and GIS dashboards improves spatial decision making and asset tracking.	High complexity in integrating digital twin and BIM technologies across multiple asset systems.
[13]	Digital System Design, Supply Chain Analysis	Geospatial tools have proven effective in mapping and monitoring university assets, improving resource allocation.	Data interoperability issues between existing geospatial systems and university asset management.
[17]	Digital Twin Maturity Model	Blockchain implementation increases data security and	Regulatory barriers and limited expertise hinder the

		transparency in asset transactions.	full adoption of blockchain in asset management.
[22]	System Development, Knowledge Management	Blockchain ensures tamper-proof data management and improves asset tracking.	Regulatory barriers and limited expertise are hampering widespread adoption of blockchain .
[29]	Data Governance, Data Mining	Integration of GIS and BI facilitates comprehensive data analysis and improves decision-making efficiency.	Data interoperability issues between GIS-BIM and existing BI frameworks.
[31]	Conceptual Framework, Value-Based Decision Making	Proposes a high-level conceptual construct for value in infrastructure asset management, emphasizing the importance of stakeholder perceptions of value.	Lack of standard value constructs for diverse infrastructure organizations.

Here is a diagram illustrating the number of articles discussing the use of technology.

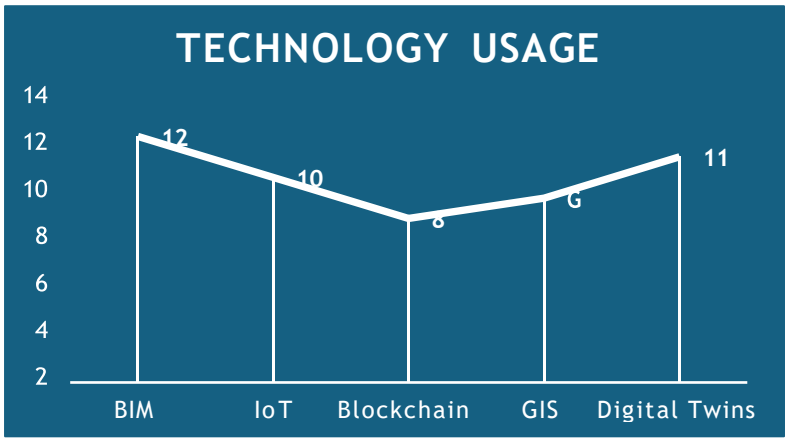

FIGURE 2. Number of technology usage

3.2 RQ2: How are these digital tools integrated with existing legacy systems in educational institutions?

Enterprise Resource Planning (ERP) systems are often incompatible with new technologies such as BIM and IoT.

- The study "Conception and Implementation Strategy of University Asset Management System " identified significant barriers to integration, including data interoperability issues and the lack of standard protocols for data exchange between BIM, GIS, and ERP systems [8].
- Likewise, the study "Taxonomy for BIM and Asset Management Semantic

Interoperability" emphasizes the importance of common data standards to facilitate seamless communication between digital tools and legacy systems [27].

- The "Integration of Asset and Budget Management in Universities" case study shows that successful integration requires a phased approach. It digitizes asset records and gradually integrates IoT sensors for real-time data collection [14].

These findings suggest that while the potential benefits of integrating digital tools are widely recognized, standardized methodologies and improved data interoperability are still needed to realize these benefits fully. The following table presents papers that discuss integrating asset management with existing systems.

TABLE 2. Articles related to asset management integration

Article	Method	Key Finding	Gap
[4]	Case Study, ISO Standard Compliance, Risk Assessment	Proposes a conceptual framework for performance management of decision support tools.	The need for post-implementation evaluation of decision support tools.
[7]	Risk Assessment, Comparison of Rating Systems	Integration of GIS and BI Tools to improve data visualization and decision making in university asset management.	Data integration and interoperability issues between GIS and BIM.
[8]	Information Systems Design, Life Cycle Management	Blockchain technology provides transparency and security for asset transactions in the higher education context.	Challenges in blockchain implementation due to regulatory issues and limited expertise.
[12]	BIM, ICT Integration, Process Reengineering	Blockchain implementation provides secure and tamper-proof asset data management across university departments.	Regulatory barriers and lack of expertise are hampering widespread adoption of blockchain in asset management.
[18]	Financial Modeling, Factor Analysis	AI-based analytics and GIS mapping	Interoperability issues between AI analytics

		provide accurate predictive insights for asset maintenance.	and geospatial data systems.
[24]	Systematic Review, Decision Framework	Digital twins and big data analytics enable predictive maintenance and optimize asset performance.	Data interoperability issues between digital twins and traditional analytics tools.
[27]	BIM Taxonomy Development	The integration of blockchain and AI ensures secure data handling and improves decision making.	Regulatory barriers and limited expertise in the application of blockchain and AI in asset management.

3.3 RQ3: What financial strategies are used to optimize asset management in educational institutions?

Financial optimization is a recurring theme in the studies reviewed, focusing on aligning asset management practices with institutional budget planning. The study "Asset Management Based on Wealth Management in Islamic Schools" discusses strategies to utilize existing assets to generate additional income, which can be reinvested in core educational activities [3].In "Integration of Asset and Budget Management in Universities", the authors emphasize the importance of aligning financial strategy with asset life cycle planning to ensure efficient resource use and timely maintenance activities [14]. Wealth management approaches to prioritize investments in asset upgrades and replacements. The study "Measuring Performance of Strategic Asset Management Plan through a Balanced Scorecard" proposes using performance metrics to evaluate the financial impact of asset management decisions and optimize budget allocations [21].

These findings underscore the importance of integrating financial planning into an asset management framework. This will enable educational institutions to maximize resource utilization and achieve long-term sustainability. The following is a table of articles discussing financial planning in asset management implementation.

TABLE 3. Articles related to financial planning in asset management

Article	Method	Key Finding	Gap
[3]	Qualitative Analysis, In-depth Interviews	Wealth management strategies increase funding capacity in Islamic educational	Financial constraints and limited access to advanced management tools in educational

		environments.	institutions.
[14]	K-means Clustering, Data Analysis	BI tools enhance data-driven decision making and streamline asset reporting processes.	Challenges in aligning BI tools with existing data governance frameworks and asset reporting standards.
[19]	Case Study, Good Governance Evaluation	BI tools streamline asset reporting and improve governance through better data integration.	Difficulty in aligning BI tools with existing data governance standards.
[20]	Quantitative Survey, Financial Analysis	IoT-based risk assessment tools optimize asset monitoring and reduce maintenance costs.	High initial costs and technical complexity limit the adoption of IoT-based risk assessment tools.
[22]	System Development, Knowledge Management	Blockchain ensures tamper-proof data management and improves asset tracking.	Regulatory barriers and limited expertise are hampering widespread adoption of blockchain .

3.4 RQ4: How is the sustainability matrix integrated into asset management practices in educational institutions?

Integrating sustainability metrics into asset management practices is increasingly recognized as a critical element in supporting green building standards and reducing the carbon footprint of academic institutions.

- The study "Development of a Model Linking Physical Asset Management to Sustainability" proposes a framework that integrates environmental indicators into asset life cycle analysis, emphasizing energy efficiency and sustainable building practices [10].
- In "Fuzzy Multicriteria Evaluation and Trends of Asset Management Performance", the authors use a multicriteria approach to assess the sustainability performance of asset management systems in educational buildings. They highlight the importance of integrating energy consumption data and green certification [16].
- "Optimization in Decision Making in Infrastructure Asset Management" discusses IoT sensors and AI-based analytics to monitor energy usage and identify carbon emission reduction opportunities in campus facilities [23].

The findings show that despite increasing attention to sustainability, many existing frameworks have not fully integrated a comprehensive sustainability matrix,

indicating the need for further research. The following table presents papers discussing integrating sustainability matrices in asset management.

TABLE 4. Articles related to the integration of sustainable matrices in asset management

Article	Method	Key Finding	Gap
[6]	RAMS, PHM, Statistical Modeling	Digital transformation improves asset lifecycle management through Industry 4.0 technologies.	The complexity of integrating various Industry 4.0 technologies into asset management processes.
[10]	RAMS, PHM, Statistical Modeling	Digital transformation improves asset lifecycle management through Industry 4.0 technologies.	The complexity of integrating various Industry 4.0 technologies into asset management processes.
[16]	Fuzzy AHP, Multi-attribute Utility Technique	Enhanced lifecycle management with BIM and IoT, improving efficiency and decision making.	Challenges in integrating digital twin and BIM with existing legacy systems.
[17]	Digital Twin Maturity Model	Blockchain implementation increases data security and transparency in asset transactions.	Regulatory barriers and limited expertise hinder the full adoption of blockchain in asset management.
[21]	Balanced Scorecard	BIM and predictive analytics improve decision making and asset lifecycle management.	The complexity of BIM integration with legacy asset management systems.
[30]	Survey Analysis, BMS Implementation	Enhanced cybersecurity reduces risks and ensures compliance with industry standards.	The challenges of maintaining strong cybersecurity while integrating multiple advanced technologies.
[31]	Conceptual	Proposes a	Lack of

	Framework Value-Based Decision Making	high-level conceptual construct for value in infrastructure asset management, emphasizing the importance of stakeholder perceptions of value.	standard value constructs for diverse infrastructure organizations.
[32]	Empirical Survey, PLS Path Modeling	Empirical analysis shows a positive relationship between PAM core practices and operational performance, emphasizing ISO 55001 compliance.	There is a need for more empirical validation of the relationship between PAM practices and performance outcomes.

3.5 RQ5: What are the key challenges and gaps in current research on asset management frameworks for educational environments?

Analysis of the reviewed literature reveals several challenges and gaps in current research. Integration issues: Many studies have shown difficulties integrating advanced digital tools with legacy systems and the lack of standard data protocols for seamless communication between technologies [8,27]. Lack of empirical validation: Although many frameworks have been proposed, only a few have been empirically validated in real educational settings [10,12]. Limited focus on blockchain: Despite its vast potential, blockchain technology has not been widely explored in the context of asset management in educational institutions, thus providing an opportunity for further research [28]. Sustainability integration: Although sustainability is a priority for many institutions, current frameworks often fail to integrate a comprehensive sustainability matrix, particularly regarding long-term resource planning and energy efficiency [10]. These challenges indicate the need for future research to focus on developing standardized integration methodologies and empirical studies and improving the integration of sustainability metrics into asset management frameworks in educational institutions. The following is a table of articles related to key challenges in asset management.

TABLE 5. Articles related to key challenges in asset management

Article	Method	Key Finding	Gap
[9]	Style Analysis, Performance	Style Analysis, strategy improves utilization and supports better decision-making in educational institutions	Style Analysis, comprehensive data governance framework within existing systems in educational institutions.

[15]	Performance Audit, Compliance Assessment	Predictive analytics and AI-based maintenance optimize asset lifecycles and reduce operational costs.	Limited implementation of predictive maintenance approaches is due to high initial costs and complexity.
[19]	Case Study, Good Governance Evaluation	BI tools streamline asset reporting and improve governance through better data integration.	Difficulty in aligning BI tools with existing data governance standards.
[24]	Systematic Review, Decision Framework	Digital twins and big data analytics enable predictive maintenance and optimize asset performance.	Data interoperability issues between digital twins and traditional analytics tools.
[25]	Strategic Review, Scientific Mapping	Enhanced cybersecurity and cloud computing solutions reduce risks and support data-driven strategies.	High costs and technical barriers to implementing a comprehensive cybersecurity framework.
[27]	BIM Taxonomy Development	The integration of blockchain and AI ensures secure data handling and improves Decision making	Regulatory barriers and limited expertise in the application of blockchain and AI in asset management
[28]	Blockchain Framework Design	IoT-based predictive systems enable real-time asset monitoring , optimizing resource allocation.	High upfront costs and technical barriers to adopting predictive IoT systems and ERP solutions.
[33]	Mixed Methods, Comparative Analysis	Traditional practices contribute significantly to social cohesion and environmental management,	The difficulty in integrating traditional and modern asset management practices without disrupting

		while modern practices enhance financial sustainability.	community dynamics.

3.5 Interpretation of Results.

The results of this SLR show a clear trend toward adopting digital tools such as BIM, GIS, IoT, and blockchain in asset management in educational institutions. These technologies can address long-standing asset tracking, maintenance, and data integration challenges. However, while the results show significant progress in asset management, several issues remain, particularly regarding system integration, empirical validation, and sustainability.

The emphasis on BIM and GIS for spatial visualization and analysis fits the growing need for efficient infrastructure planning and management in educational institutions. BIM's ability to create detailed 3D models has proven effective in optimizing space usage and improving maintenance schedules. GIS, similarly, enables more effective spatial mapping and analysis, which is critical in managing large-scale university/college environments. However, there are challenges in integrating these tools with legacy systems, as many educational institutions, especially universities, still rely on traditional ERP systems that are not designed to handle real-time data streams from IoT sensors or blockchain.

4 Conclusions.

This SLR study aims to explore asset management practices in educational institutions, focusing on digital tool adoption, integration with existing systems, financial strategies, sustainability metrics, and identifying research gaps. Analysis of 33 peer-reviewed papers reveals several key trends and patterns, as follows:

1. Adoption of digital tools: There is a clear trend towards adopting advanced digital technologies such as BIM, GIS, IoT, and blockchain in asset management. These technologies have been shown to improve asset visualization, enable real-time monitoring, and improve the accuracy of asset tracking. BIM and GIS, in particular, are widely used for spatial analysis and infrastructure management, IoT offers predictive maintenance capabilities, and blockchain provides secure record-keeping.
2. System integration challenges: One of the review's significant findings was the ongoing challenge of integrating modern digital tools with legacy systems, such as traditional ERP systems. Data interoperability, inconsistent data formats, and a lack of standard protocols hinder the seamless integration of BIM, GIS, IoT, and blockchain. The need for a standard data exchange framework is clear, as it will facilitate more efficient integration and better data utilization.
3. Financial optimization strategies: The review emphasizes aligning asset management

   practices with an institution's financial planning. Effective financial strategy, such as risk assessment, wealth management, and performance metrics, can improve resource allocation and support long-term sustainability. Integrating asset lifecycle planning into budget decisions allows institutions to prioritize maintenance and renewal, optimizing the use of financial resources.

4. Integration of sustainability metrics: The application of sustainability considerations in asset management practices is increasingly emphasized in the literature. Educational institutions are beginning to adopt green building standards, energy efficiency measures, and environmental impact assessments. However, many existing frameworks do not fully integrate comprehensive sustainability metrics, indicating the need for further development in this area. The use of IoT sensors for energy monitoring and AI-based analytics to identify inefficiencies are promising trends that can improve sustainability.
5. Research gaps and future directions: The review identified several gaps in current research, including limited focus on empirical validation of digital tools, challenges in integrating new technologies with legacy systems, and the lack of a comprehensive framework that includes financial and sustainability considerations. Furthermore, exploration of blockchain technology in educational asset management remains limited despite its great potential to improve data security and transparency.

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