

Assessment of Digital Inventory Management among Construction Firms in Lagos State

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The inefficiencies in inventory management practices within the Nigerian construction industry have contributed to project delays and resource wastage. This study investigates the adoption of digital inventory management systems in the Nigerian construction industry, focusing on Lagos State. The research employs a descriptive design, utilizing random sampling to survey construction professionals. Data collected via structured questionnaires and out of 240 questionnaires distributed in Lagos State, 150 were duly completed and retrieved for analysis, yielding a response rate of 62.5%. The results revealing that while the industry recognizes the benefits of digital inventory management, full adoption is hindered by high initial costs, lack of adequate staff training, and challenges in integrating digital systems with existing processes. The findings indicate that regular system maintenance and user-friendliness are critical for successful implementation. The study concludes that construction professionals in Lagos State recognise the value of digital inventory management, particularly in improving accuracy, efficiency, and response to material demand, but full adoption remains limited. The study recommends financial incentives for SMEs, comprehensive training programs, and investment in user-friendly, compatible systems to enhance inventory management efficiency and promote wider digital adoption, thereby improving project performance and supporting sustainable economic growth in Nigeria.

Keywords: Adoption, inventory management, radio frequency identification, digital inventory, enterprise resource planning, Lagos

Introduction

The construction industry is a cornerstone of Nigeria's economy, playing a pivotal role in infrastructure development, job creation, and GDP contribution (Babalola *et al.*, 2024). However, despite its critical importance, the industry grapples with persistent inefficiencies, particularly in inventory management, which significantly hampers project performance (Ogundipe *et al.*, 2024). Traditional inventory management practices in the Nigerian construction sector are predominantly manual and paper-based, leading to several issues, including material shortages, overstocking, and excessive wastage (Isah *et al.*, 2021; Albert *et al.*, 2024). They emphasize that poor inventory control is a major contributor to project inefficiencies, making it imperative to explore more effective inventory management solutions (Bello *et al.*, 2024; Lessing, 2021).

In recent years, digital inventory management systems have emerged as a transformative solution, leveraging advanced technologies such as barcoding, Radio Frequency Identification (RFID), the Internet of Things (IoT), and cloud computing to enhance inventory control (Mashayekhy *et al.*, 2022; Wamba & Chatfield, 2009). These digital systems offer significant advantages over traditional methods, providing real-time tracking, automated data entry, and improved

accuracy. Research by Tan and Sidhu (2022) underscored the potential of these technologies to streamline inventory processes, reduce human errors, and enable better decision-making through data analytics. Furthermore, digital inventory management aligns with the broader trend towards digital transformation in various industries, promoting operational efficiency and competitiveness (Dutta *et al.*, 2020).

Despite the evident benefits, the adoption of digital inventory management systems in Nigeria's construction industry remains limited (Bello *et al.*, 2024). High initial implementation costs, lack of technical expertise, and resistance to change are significant barriers preventing widespread adoption. A study by Chen *et al.* (2024) highlighted that many construction firms, especially small and medium-sized enterprises (SMEs), struggle with the financial and technical demands of transitioning to digital systems. Additionally, inadequate infrastructure and limited access to reliable internet connectivity further complicate the adoption process, making it difficult for companies to fully leverage digital technologies as discussed by Adebisi and Adekola (2016). Inventory management is critical in the construction industry, which relies heavily on the timely availability of materials. Effective inventory management can reduce

costs, prevent project delays, and enhance overall efficiency. According to Eze *et al.* (2020), poor inventory management practices often lead to significant project overruns and increased costs. Similarly, Patil and Pataskar (2013) found that efficient inventory systems are essential for minimizing material wastage and ensuring timely project completion. These insights underscore the importance of adopting robust inventory management practices to enhance productivity and cost-effectiveness in construction projects.

Nevertheless, there are promising examples of successful digital inventory management implementations in other contexts, suggesting a potential roadmap for Nigeria construction industry. For instance, Lu *et al.* (2011) reported substantial improvements in inventory control and project efficiency in a large construction project in China following the adoption of an RFID-based system. Similarly, Bose *et al.* (2022) documented the benefits of a cloud-based inventory management platform in India, which provided real-time visibility and enhanced procurement efficiency. These case studies demonstrate that with the right strategies and support, digital inventory management can significantly improve project outcomes and drive growth in the construction industry.

Thus, the gap this study addresses is the limited empirical understanding of digital inventory management adoption in Lagos State, including how construction firms perceive its benefits, the challenges they encounter, and the extent to which they have transitioned from manual to digital systems. Filling this gap will provide localized insights that can guide practical interventions, policy-making, and training programs to enhance adoption and improve project performance in the Nigerian construction sector. Therefore, this study aims to provide a comprehensive appraisal of digital inventory management among construction firms in Lagos State, assessing current practices, the extent of digital adoption, and the associated benefits and challenges. By offering actionable recommendations, the research seeks to facilitate the transition to digital systems, thereby enhancing inventory management, reducing costs, and improving overall project performance. This is particularly relevant for Nigeria as it strives to modernize its infrastructure and achieve sustainable economic growth.

Literature Review

Current state of inventory management in Nigeria

In the Nigerian construction industry, traditional inventory management practices dominate, characterized primarily by manual methods such as using ledgers and spreadsheets. These practices are

deeply entrenched due to their familiarity and the relatively low immediate costs associated with them. According to Eze *et al.* (2020), most Nigerian construction firms rely on manual tracking for inventory management, which often leads to inefficiencies and inaccuracies. This reliance on outdated methods persists despite the availability of more advanced digital solutions that could significantly enhance inventory management processes. Moreover, the dominance of manual inventory management practices is compounded by several existing challenges, notably infrastructural issues and a lack of trained personnel. Infrastructural deficiencies, such as unreliable power supply and limited internet connectivity, pose significant barriers to the adoption of digital systems. Oke *et al.* (2023) highlighted that the inconsistent power supply in Nigeria hampers the effective use of digital technologies, making it difficult for construction firms to maintain real-time inventory data. Moreover, the limited reach and quality of internet services further exacerbate these challenges, restricting the ability of firms to adopt cloud-based solutions and other advanced digital tools.

Another critical challenge is the shortage of trained personnel proficient in modern inventory management technologies. The lack of skilled workers who can effectively operate and maintain digital systems is a significant hindrance to their adoption. As noted by Eze *et al.* (2019), the Nigerian construction industry suffers from a skills gap, with many employees lacking the necessary training and expertise in digital inventory management. This skills deficit not only slows the implementation of new technologies but also affects their effective utilization, reducing the potential benefits that could be realized from digital inventory systems. Primarily, the current state of inventory management in Nigeria is marked by the predominance of traditional manual methods and significant challenges, including infrastructural issues and a lack of trained personnel. These factors contribute to inefficiencies and inaccuracies in inventory management, highlighting the need for a strategic shift towards digital solutions. Addressing these challenges is crucial for the Nigerian construction industry to fully realize the benefits of improved inventory management practices and enhance overall project efficiency and effectiveness.

Adoption of digital inventory management in the Nigerian construction industry

Efficient inventory management is vital in this sector due to the complex nature of construction projects, which require the timely and precise coordination of materials and resources. Traditional inventory management practices, often reliant on manual tracking and periodic audits, have been identified as major sources of inefficiency and error. According to Tsegaye (2019), manual methods of inventory management in

the Nigerian construction industry are not only labour-intensive but also prone to significant human errors and inaccuracies, leading to project delays and increased costs. The advent of digital technologies has revolutionized inventory management across various industries, including construction. Digital inventory management systems, which incorporate technologies such as RFID, barcoding, and cloud computing, offer real-time data, enhanced accuracy, and automation of inventory processes (Esrar *et al.*, 2023; Bose *et al.*, 2022). A study by Niaz (2022) highlighted that the adoption of digital inventory systems can lead to substantial improvements in operational efficiency and cost savings, particularly in sectors characterized by high inventory turnover and complex supply chains.

However, the adoption of digital inventory management in the Nigerian construction industry is still in its nascent stages. This literature review aims to provide a comprehensive appraisal of digital inventory management in the Nigerian construction industry. It assesses the current state of inventory management practices, evaluate the extent of adoption of digital systems, analyse the associated benefits and challenges, and offer recommendations for improving inventory management practices through digital solutions. By synthesizing findings from existing research, establishes a solid foundation for the subsequent analysis and discussion in this study.

The extent of adoption of digital inventory management systems within the Nigerian construction industry has been slow and uneven. Research by Wynn and Olayinka (2021) revealed that only a small percentage of construction firms in Nigeria have fully transitioned to digital inventory systems. The adoption rates are higher among multinational corporations and larger indigenous firms that have the financial capacity and technical expertise to invest in such systems. However, for small and medium-sized enterprises (SMEs), the adoption of digital inventory management remains a challenge due to high upfront costs and the lack of skilled personnel to manage the technology effectively (Tuan *et al.*, 2018).

In a comparative context, countries such as South Africa and Kenya have recorded higher adoption rates of digital inventory management, partly due to better access to technology infrastructure and government incentives for digital transformation (Wairiuko *et al.*, 2018). The limited digital adoption in Nigeria suggests that there is a need for more investment in technological infrastructure and training to bridge the gap between Nigeria and other more digitally advanced regions. The barriers to adoption include not just financial and technical constraints but also cultural factors, such as resistance to change and the preference for familiar, manual processes (Aliu & Oke, 2023).

Benefits of digital inventory management

Digital inventory management systems offer several significant benefits, including real-time tracking, improved accuracy, cost savings, and enhanced decision-making. Real-time tracking is one of the most prominent benefits of digital inventory management systems. By providing instant updates on inventory levels, these systems enable construction managers to make timely and informed decisions (Bhattacharya & Chatterjee, 2022). According to Alick (2016), real-time tracking ensures that materials are available when needed, reducing the likelihood of project delays caused by stockouts or overstocking. The ability to monitor inventory in real-time also facilitates better coordination among project teams, enhancing overall workflow efficiency.

Additionally, improved accuracy is another critical benefit of digital inventory management system. The automation of data entry and tracking processes significantly reduces the risk of human errors that are common in manual systems. Xin *et al.* (2021) established that technologies such as RFID and barcoding improve inventory accuracy by providing precise and automated tracking of materials. This accuracy not only minimizes discrepancies between recorded and actual inventory levels but also enhances the reliability of inventory data, which is crucial for effective project management. Furthermore, cost savings are a substantial advantage of adopting digital inventory management systems. By automating inventory processes, these systems lower labour costs associated with manual data entry and periodic audits. Aslam (2023) found that ERP systems reduce operational costs by streamlining inventory management and minimizing the need for manual intervention. In addition, Ammar *et al.* (2021) asserted that digital systems help reduce material wastage by ensuring optimal inventory levels are maintained, thereby avoiding the costs associated with overstocking and stock obsolescence. The combined effect of lower labour costs and reduced wastage contributes to significant cost savings for construction firms. Enhanced decision-making is facilitated by the data-driven insights provided by digital inventory management systems. These systems generate comprehensive and accurate inventory data that can be analysed to identify trends, forecast demand, and optimize inventory levels. According to Oliveira and Handfield (2019), the analytical capabilities of inventory management software enable construction managers to make informed decisions based on real-time data and predictive analytics. This data-driven approach leads to better resource allocation, improved project planning, and increased operational efficiency.

Challenges of digital inventory management

Digital inventory management in the construction industry offers significant benefits, such as increased efficiency and real-time tracking, but there are also several challenges associated with its implementation and use. The challenges associated with digital inventory management are not negligible. One of the most pressing challenges is the high cost of acquiring and maintaining the necessary technology infrastructure. In a study by Chen *et al.* (2021), it was found that smaller firms often struggle to justify the investment in digital systems, particularly when they operate on tight margins. Additionally, the skills gap is a significant barrier, as many construction workers and managers lack the technical expertise to operate advanced inventory management software. Many construction companies still rely on manual processes or legacy systems that are not easily integrated with new digital tools. Integrating digital inventory management with other systems like procurement, project management, and accounting can be difficult (Vaka, 2024). Different suppliers and contractors may use different software or formats for inventory tracking, making it hard to consolidate and standardize data across multiple teams and systems. Construction industry workers, particularly those in the field, may be accustomed to traditional, paper-based inventory methods and may resist adopting digital systems. There may be a significant learning curve for staff, especially those who are not digitally literate, to effectively use and maintain the new technology. More so, digital inventory systems are vulnerable to cyberattacks, which can compromise sensitive project data or lead to theft (Neumeyer *et al.*, 2020). Other challenges include the inconsistent power supply and poor internet connectivity, which can disrupt the seamless functioning of digital systems (Udegbunam *et al.*, 2023). Thus, while the benefits of digital inventory management are clear, the challenges must be addressed to ensure successful adoption across the industry.

Research Methodology

This study employed a descriptive survey research design to examine the adoption, benefits, and challenges of digital inventory management systems among construction firms in Lagos State. Descriptive research design aims to provide an accurate portrayal of characteristics, behaviours, or phenomena within a specific population or area of interest (Saunders *et al.* 2019). This design was suitable because it provided first-hand quantitative insights from professionals who work directly with inventory processes on construction projects. The study population comprised construction professionals in registered firms across Lagos State, including architects, builders, project managers, site engineers, and inventory managers. These groups were

purposely chosen because of their direct involvement in material planning, procurement, inventory tracking, and project execution. A total of 240 structured questionnaires were distributed using a random sampling technique to ensure fair representation across the profession. Out of these, 150 were duly completed and returned, giving a response rate of 62.5%. Random sampling was used to ensure that every eligible professional had an equal chance of being selected, thereby improving the representativeness of the sample. Data collection was carried out using a structured, close-ended questionnaire developed in alignment with the study objectives. A five-point Likert scale ranging from strongly agree to strongly disagree was adopted. To ensure content validity, the questionnaire was reviewed by experts in construction management and industry practitioners. Their suggestions helped improve clarity and contextual relevance. Reliability was strengthened through preliminary checks to confirm consistent understanding among potential respondents. Questionnaires were shared both physically and electronically with professionals working in active construction firms across Lagos State. Follow-up reminders which including emails, calls, and site visits were used to achieve an acceptable response rate. All completed questionnaires were analysed using SPSS (Version 26.0). Data analysis involved frequency and percentage distributions for demographic information, as well as mean score rankings and other descriptive statistics to assess adoption levels, perceived benefits, and implementation challenges. The use of mean scores enabled the ranking of key factors from most to least influential. Participation in the study was entirely voluntary. Respondents were assured that their information would remain confidential and would be used strictly for academic purposes. No personal identifiers were collected, ensuring full anonymity throughout the research process.

Results

Characteristics of respondents

Table 1 shows the profile of respondents. The educational qualification of respondents reveals that a significant majority (86%) hold a Bachelor's degree, while 10% have a Master's degree, and only 4% possess a Diploma or National Certificate. This high level of educational attainment is expected in professional sectors like construction, where advanced knowledge and technical skills are crucial for effectively managing processes such as digital inventory systems. The professional roles of the respondents, highlighting that the majority (39.3%) are Builders, followed by Project Managers (24%), Site Engineers (14.7%), Inventory Managers (11.3%), and Architects (10.7%). The high representation of Builders suggests that this role is more available in construction projects. The largest

percentage of respondents (47.3%) have 1 to 5 years of experience, followed by 36% who have 6 to 10 years of experience. A smaller percentage (12%) have less than 1 year of experience, while only 4.7% have over 15

years of experience. This distribution indicates that the majority of respondents are relatively early- to mid-career professionals, which could influence their familiarity and comfort with digital technologies.

Table 1: Profile of respondents

	Frequency	Percentage
Educational Qualifications		
Diploma or National certificate	6	4
Bachelor's Degree	129	86
Master's Degree	15	10
Total	150	100
Professionals		
Architects	16	10.7
Builders	59	39.3
Inventory managers	17	11.3
Project managers	36	24.0
Site engineers	22	14.7
Total	150	100
Year of experience		
Less than 1 year	18	12.0
1-5 years	71	47.3
6-10 years	54	36
Over 15 years	7	4.7
Total	150	100

Adoption of digital inventory management systems

Table 2 presents the adoption of digital inventory management systems within the construction industry. The highest mean score (3.693) was observed for the regular updating and maintenance of digital inventory management systems, indicating that a significant number of respondents agree that maintaining these systems is critical for their successful adoption. The second highest-ranked item, with a mean score of 3.667, pertains to the user-friendliness and reliability of these systems. This suggests that respondents view ease of use and consistent performance as crucial elements in their successful implementation. The 3rd rank is the significant improvement in efficiency due to digital inventory management, which had a mean score of 3.607. This result indicates that many respondents recognize the efficiency gains that can be achieved through digital solutions in managing inventory.

The result also includes the use of digital platforms to track inventory in real-time (mean = 3.473) and the smooth transition to digital inventory management in organizations (mean = 3.480). These findings suggest that, while real-time tracking and smooth transitions are considered important, there may still be challenges in fully realizing these outcomes in practice.

Lastly, the lowest-ranked item was the full adoption of digital inventory management systems, with a mean score of 3.320. This suggests that while digital inventory systems are being utilized to some extent, full adoption across organizations may still be limited. Resistance to complete implementation could stem from integrating these systems into traditional workflows or a lack of adequate training, as indicated by other challenges identified in the study.

Table 2: Adoption of digital inventory management systems

Adoption	SA	A	N	D	SD	Mean	Rank
Full adoption of digital inventory management systems	45 (30)	0 (0)	63 (42)	42 (28)	0 (0)	3.320	9
Use of digital platforms to track inventory in real-time	23 (15.3)	59 (39.3)	43 (28.7)	16 (10.7)	9 (6)	3.473	7
Smooth transition to digital inventory management in the organization	23 (15.3)	50 (33.3)	53 (35.3)	24 (16)	0 (0)	3.480	5.5
Significant improvement in efficiency due to digital inventory management	46 (30.7)	30 (20)	55 (36.7)	7 (4.7)	12 (8)	3.607	3
Regular updating and maintenance of digital inventory management systems	55 (36.7)	18 (12)	59 (39.3)	12 (8)	6 (4)	3.693	1
Investment in training staff on digital inventory management tools	27 (18)	43 (28.7)	58 (38.7)	19 (12.7)	3 (2)	3.480	5.5
Support from top management for the adoption of digital inventory management systems	52 (34.7)	3 (2)	55 (36.7)	28 (18.7)	12 (8)	3.367	8
Challenges in integrating digital inventory management systems with existing processes	23 (15.3)	40 (26.7)	51 (34)	24 (16)	12 (8)	3.253	10
User-friendliness and reliability of digital inventory management systems	52 (34.7)	24 (16)	46 (30.7)	28 (18.7)	0 (0)	3.667	2
Clear organizational policy on the use of digital tools for inventory management	33 (22)	43 (28.7)	50 (33.3)	18 (12)	6 (4)	3.527	4

Benefits of adopting digital inventory management systems

Table 3 presents the benefits perceived by respondents regarding the adoption of digital inventory management systems in the construction industry. The highest ranked benefit, with a mean score of 3.960, was the ability to respond faster to inventory demands and changes. This finding suggests that digital systems provide enhanced agility in inventory operations, a critical factor for maintaining smooth project workflows. The second highest-ranked benefit was the enhanced accuracy of inventory records (mean = 3.947), showing the capacity of digital systems to minimize errors and discrepancies that can arise in manual processes. Improved operational efficiency (mean = 3.920) ranked third, indicating that digital inventory systems streamline processes, allowing for more efficient resource allocation and decision-

making in construction projects. Better cost management and reduction in overstocking (mean = 3.853) was also highly rated, pointing to the financial advantages of adopting such systems, as they allow for more precise inventory levels and help avoid unnecessary expenditures. Furthermore, enhanced integration with other business systems (mean = 3.820) ranked fifth, reflecting the versatility of digital systems in connecting various operational facets of construction businesses. However, despite these positive findings, real-time visibility of inventory levels received the lowest mean score (3.560), suggesting that while this benefit is acknowledged, it may not be as universally experienced or impactful as other benefits. This disparity could be due to implementation challenges or variability in the quality of systems used across different firms.

Table 3: Benefits of adoption of digital inventory management systems

Benefit	SA	A	N	D	SD	Mean	Rank
Enhanced accuracy of inventory records	73 (48.7)	29 (19.3)	24 (16)	15 (10)	9 (6)	3.947	2
Real-time visibility of inventory levels	45 (30)	40 (26.7)	28 (18.7)	28 (18.7)	9 (6)	3.560	10
Improved operational efficiency	67 (44.7)	31 (20.7)	25 (16.7)	27 (18)	0 (0)	3.920	3
Data-driven insights for better decision-making	48 (32)	44 (29.3)	24 (16)	28 (18.7)	6 (4)	3.667	9
Enhanced integration with other business systems	41 (27.3)	63 (42)	24 (16)	22 (14.7)	0 (0)	3.820	5
Reduction in human errors during inventory management	47 (31.3)	39 (26)	40 (26.7)	24 (16)	0 (0)	3.727	7
Faster response to inventory demands and changes	55 (36.7)	49 (32.7)	37 (24.7)	3 (2)	6 (4)	3.960	1
Improved tracking of inventory movement	40 (26.7)	53 (35.3)	33 (22)	18 (12)	6 (4)	3.687	8
Better cost management and reduction in overstocking	54 (36)	38 (25.3)	43 (28.7)	12 (8)	3 (2)	3.853	4
Streamlined communication between departments and suppliers	51 (34)	42 (28)	36 (24)	12 (8)	9 (6)	3.760	6

Challenges of adopting digital inventory management systems

Table 4 presents the challenges of adopting digital inventory management systems in the construction industry. The result shows that lack of adequate staff training on digital inventory tools emerged as the most prominent challenge, with a mean score of 3.900. This indicates that construction companies are encountering substantial difficulties in equipping their staff with the necessary skills to effectively use digital inventory systems. Also, the difficulty in integrating digital inventory systems with existing processes was ranked 2nd with a mean score of 3.840. This issue likely arises from the complexity of merging new technologies with long-established manual or semi-digital processes in the construction industry.

Furthermore, the high initial cost of implementing digital systems was ranked 3rd, with a mean of 3.820. This may indicate that financial burden associated with acquiring the necessary technology, software licenses, and hardware, in addition to training staff, presents a considerable obstacle to widespread adoption. For many firms, the return on investment may not be immediately apparent, leading to hesitation in committing substantial financial resources to these systems. The challenge of

technical support and system maintenance issues was ranked 4th, with a mean score of 3.813. This indicates that post-adoption technical challenges, such as system maintenance and obtaining reliable technical support, continue to pose a significant issue. Construction firms often rely on external vendors for system updates and troubleshooting, which can create dependencies that slow down operational efficiency. Dependence on external vendors ranked 5th with a mean score of 3.747, further emphasizing the industry's need for more self-reliance in managing digital systems.

Furthermore, inconsistent or inaccurate data input affecting system reliability was ranked 6th, with a mean score of 3.660. Without accurate data, the benefits of digital inventory management, such as real-time tracking and decision-making, may not be fully realized. Lastly, resistance to change by staff in adopting digital inventory management scored a mean of 3.347, ranking lowest among the challenges. This may indicate that cultural resistance and reluctance to embrace new technologies remain significant obstacles. Staff may prefer the familiarity of traditional methods or may lack confidence in the reliability and benefits of digital systems.

Table 4: Challenges of adopting digital inventory management systems

Challenges	SA	A	N	D	SD	Mean	Rank
Resistance to change by staff in adopting digital inventory management	25 (16.7)	42 (28)	55 (36.7)	16 (10.7)	12 (8)	3.347	10
Complexity and technical challenges in adopting digital inventory systems	23 (15.3)	54 (36)	39 (26)	28 (18.7)	6 (4)	3.400	9
High initial cost of implementing digital systems	43 (28.7)	61 (40.7)	28 (18.7)	12 (8)	6 (4)	3.820	3
Data security concerns	23 (15.3)	65 (43.3)	50 (33.3)	0 (0)	12 (8)	3.580	8
Lack of adequate staff training on digital inventory tools	60 (40)	42 (28)	27 (18)	15 (10)	6 (4)	3.900	1
Difficulty in integrating digital inventory systems with existing processes	27 (18)	81 (54)	33 (22)	9 (6)	0 (0)	3.840	2
Limited access to reliable internet or digital infrastructure	39 (26)	44 (29.3)	33 (22)	34 (22.7)	0 (0)	3.587	7
Technical support and system maintenance issues	29 (19.3)	73 (48.7)	39 (26)	9 (6)	0 (0)	3.813	4
Dependence on external vendors for system updates and troubleshooting	51 (34)	43 (28.7)	29 (19.3)	21 (14)	6 (4)	3.747	5
Inconsistent or inaccurate data input affecting system reliability	35 (23.3)	50 (33.3)	50 (33.3)	9 (6)	6 (4)	3.660	6

Discussion of Findings

Adoption of digital inventory management systems

The analysis of the adoption of digital inventory management systems within the construction industry shows that the regular updating and maintenance of these systems is highly prioritized. This result aligns with previous studies, such as by Fadeyi (2021), which emphasize that continuous system maintenance is essential for sustaining digital solutions in construction. Maintaining digital systems ensures they remain functional and reliable, addressing issues such as software bugs and outdated processes that could hinder efficient inventory management. User-friendliness and reliability, ranked second further highlight the importance of intuitive and stable systems for successful adoption. These finding echoes similar conclusions by Nwankwo (2023), who found that construction firms are more likely to adopt digital inventory tools that are easy to use and consistently perform well. A complex or unreliable system can deter full implementation, especially in an industry that may still be adjusting to the digital shift. The third-ranked improvement in efficiency, indicates that many respondents have observed tangible benefits from digital systems, which resonates with research by Ajiga *et al.* (2024). They also

found that digital inventory systems significantly enhance operational efficiency by reducing manual errors, streamlining processes, and improving accuracy. However, despite this perceived improvement, it seems the industry's overall shift toward full digital adoption remains gradual. Real-time inventory tracking and the smooth transition to digital systems are considered important but are not fully realized. Studies like Vaka (2024) pointed out that real-time tracking can transform inventory management, offering instant visibility and control over stock levels. However, they also identified issues such as data integration and inconsistent network connectivity as hurdles in achieving seamless real-time tracking. Similarly, the transition to digital platforms is often hindered by legacy systems, as firms struggle to align new technologies with their established workflows, which may explain the moderate ranking of these factors (Isah *et al.*, 2020; Cozzolino *et al.*, 2021). The full adoption of digital inventory systems reflects ongoing resistance to complete digital integration. As noted by Eze *et al.* (2019), barriers such as inadequate training, resistance to change, and high initial costs are significant factors limiting full-scale adoption. The reluctance to fully embrace digital systems also underscores a gap between recognizing the potential

benefits and overcoming practical challenges in the construction industry.

Benefits of digital inventory management systems

The results reveal that adopting digital inventory management systems offers significant benefits, with the ability to respond faster to inventory demands and enhanced accuracy of inventory records ranked highest. These findings align with research by Mrugalska and Ahmed (2021), which highlighted the agility and error reduction provided by digital systems, crucial for maintaining smooth construction workflows. Improved operational efficiency and better cost management through reduced overstocking further support previous studies (Bilal *et al.*, 2016; Dallasega *et al.*, 2018) on the financial and operational advantages of digital tools. The result also shows that better cost management and reduction in overstocking for digital inventory management in construction. This aligns with the study by Bose *et al.* (2022), that in the construction industry, effective inventory management is crucial to controlling costs, improving efficiency, and reducing waste. Systems can play a transformative role in achieving better cost management and reducing issues like overstocking. Digital systems provide real-time tracking of materials, tools, and equipment, allowing project managers and procurement teams to monitor stock levels at all times (Xin *et al.*, 2021). By knowing exactly what's in stock, digital systems help prevent unnecessary orders, reducing the risk of overstocking materials that might not be needed until later in the project. The result also agrees that enhanced integration with other business systems as benefit of digital inventory in construction. This also in agreement with the study by Bello *et al.* (2024), that a digital inventory system integrated with procurement platforms ensures that construction teams automatically reorder materials when stock levels drop below predefined thresholds. This aligns procurement with project timelines, reducing delays caused by material shortages (Albert *et al.*, 2018). Sync purchase orders directly with suppliers for more efficient delivery tracking and cost management. Real-time visibility of inventory levels is a key benefit of digital inventory systems in construction (Chopra *et al.*, 2022). Construction projects often face delays when essential materials or tools are unavailable on-site. Digital inventory systems allow project managers to track stock levels in real-time, minimizing the risk of running out of materials when they're needed most (Koctas-Cotur *et al.*, 2024). However, the lowest-ranked benefit, real-time visibility of inventory levels suggests challenges in fully implementing this feature, possibly due to technical issues such as data synchronization, as noted by Mihai *et al.* (2022).

Challenges of digital inventory management systems

The significant challenges hinder full adoption, with inadequate staff training and difficulty integrating digital systems with existing processes being the most prominent. Haleem *et al.* (2022) similarly identified training gaps as a critical issue, while Eriksson *et al.* (2022) emphasise the struggle to merge digital technologies with traditional methods. High initial costs and reliance on external vendors for system maintenance also pose barriers, reflecting findings from Eriksson *et al.* (2022) and Chauhan *et al.* (2021). Integrating digital inventory systems with existing processes in the construction industry can be particularly challenging due to several factors that stem from the complexity and variety of workflows, systems, and technologies in use. Many construction companies still rely on legacy systems, spreadsheets, or manual processes for inventory management (Albert *et al.*, 2025; Adebisi & Adekola, 2016). These systems may not be compatible with modern digital tools, leading to significant integration challenges. Older systems often store data in formats that are not easily readable or translatable to newer software, requiring a significant amount of data transformation or even data entry to make integration possible (Best *et al.*, 2022). Construction companies often use a variety of tools for different functions such as project management, procurement, scheduling, and finance that don't naturally communicate with each other (Eze *et al.*, 2020). So, inventory management is often just one of these silos, and connecting them can be complex and time-consuming. There is no universal standard for inventory management in construction, leading to different departments or teams using varying approaches. For example, a procurement team might use one system to track orders, while the warehouse team uses a separate one to track stock levels, making it hard to synchronize. The high initial cost of implementing digital systems is a significant barrier for many organizations, especially small and medium-sized enterprises (SMEs) or those in industries with tight margins (Omar, 2023). The purchase of servers, computers, networking equipment, and other necessary hardware can be expensive, especially for larger systems or high-performance requirements. Also, many digital systems require costly enterprise software solutions, such as enterprise resource planning (ERP), customer relationship management (CRM) software, or custom-built applications (Munthe, 2022; Cichosz *et al.*, 2020). Resistance to change by staff, though ranked lowest, remains a challenge, underscoring the need for continued efforts to address cultural barriers to adoption.

Conclusion

The study showed that though construction professionals in Lagos State recognised the value of digital inventory management, particularly in improving

accuracy, efficiency, and response to material demands but full adoption remains limited. Key barriers included inadequate staff training, high initial costs, integration difficulties, and weak digital infrastructure. While user-friendliness and regular system maintenance support partial adoption, many firms still relied on manual methods, slowing digital transformation across the sector. With regards to the implications, the findings highlighted that effective digital adoption depended not only on technology availability but also on organizational readiness and workforce capability. Practically, firms that strengthen digital competence and integrate systems strategically stand to improve cost control, reduce waste, and enhance project performance. Policymakers and regulators can leverage these insights to design supportive initiatives that promote wider digitalization in the industry. For limitations, the study is limited by its focus on Lagos State, reliance on self-reported data, and its cross-sectional design. Additionally, the absence of qualitative insights restricted deeper understanding of organisational behaviour and resistance factors.

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