

# The Role of Digitalization and Technology in the Development of the Construction Sector in Somalia: A Case Study of Hadiid Industries Group

Fowzi Jamal Mohamed Barrow<sup>1</sup>; Abdirahman Nor Hassan<sup>2</sup>

<sup>1</sup>Department of Marketing, Hadiid Industries Group

<sup>2</sup>Department of Project Management & Sales, Hadiid Industries Group Digfer Road, Hodan Dist, Mogadishu, Somalia

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**Abstract:** The construction industry plays a critical role in Somalia's economic recovery, urban development, and employment generation, particularly in rapidly growing urban centers such as Mogadishu, Hargeisa, Kismayo, Baidoa, and Garowe. Despite increasing demand for modern infrastructure, many construction companies continue to rely on manual and fragmented operational practices, resulting in inefficiencies, cost overruns, project delays, and limited transparency. While digitalization and technological innovation—such as Building Information Modeling (BIM), project management systems, Enterprise Resource Planning (ERP), automated equipment, and data analytics—have transformed the global construction industry, their adoption in Somalia remains limited and uneven. This study examines the impact of technology and digitalization on the growth and performance of Somalia's construction industry, using Hadiid Industries Group as a case study. Rather than focusing on a single technology, the research explores how the combined use of multiple digital and technological tools influences project execution, operational efficiency, coordination, and organizational growth. A mixed-methods research approach is employed, integrating qualitative data from interviews and document analysis with quantitative data from surveys and performance indicators.

**Keywords:** Construction Industry; Digitalization; Technology Adoption; Building Information Modeling (BIM); Enterprise Resource Planning (ERP); Project Management Systems; Mixed-Methods Research; Somalia; Post-Conflict Development; Organizational Performance.

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## I. INTRODUCTION

The construction sector plays a crucial role in economic development, infrastructure provision, and employment creation, particularly in developing and post-conflict countries such as Somalia. In recent years, Somalia has witnessed rapid urban growth, increasing private-sector investment, and rising demand for construction materials and modern infrastructure, especially in major urban centers such as Mogadishu, Hargeisa, Kismayo, Baidoa and Garowe. These developments have intensified the need for construction firms to improve efficiency, quality, transparency, and timely project delivery in a challenging operational environment.

The construction industry has undergone significant global transformation due to technological innovation and digitalization. Coordination, cost control, productivity, and decision-making have all improved with the use of digital

tools like Building Information Modeling (BIM), digital project management systems, automated production technologies, data analytics, and Enterprise Resource Planning (ERP) systems, among others. By facilitating improved technical and administrative function integration, these technologies help construction companies handle complicated projects more skillfully.

The use of digitalization and contemporary technologies in Somalia's construction industry is still restricted and uneven. Due to their continued reliance on manual procedures and disjointed information systems, many construction companies experience inefficiencies, project delays, cost overruns, and a lack of accountability. However, in order to boost organizational effectiveness and operational performance, some top companies have started utilizing digital tools, such as project management software, contemporary equipment, and integrated information systems like ERP platforms. One company that has made progress

toward technology adoption in Somalia's manufacturing and construction sector is Hadiid Industries Group.

Using Hadiid Industries Group as a case study, this study investigates the impact of technology and digitalization on the growth of Somalia's construction industry. Instead of concentrating on a single technology, the study investigates how the use of different digital and technological tools affects project execution, operational efficiency, coordination, and overall organizational growth.

The study uses a mixed-methods research approach to achieve these goals, combining qualitative data (such as interviews and document analysis) with quantitative data (such as survey responses and performance indicators). This methodological approach allows for a thorough examination of the contextual experiences, difficulties, and opinions of stakeholders within the organization in addition to the quantifiable results of technology adoption.

The results of this study are anticipated to add to the scant body of scholarly literature on construction digitalization in Somalia and offer useful advice on how technology can be used to support the modernization and sustainable development of the country's construction industry to stakeholders, policymakers, and construction companies.

## II. RESEARCH OBJECTIVE

### ➤ *General Objective*

To examine the role of digitalization and technology in enhancing efficiency and supporting the development of the construction sector in Somalia, using Hadiid Industries Group as a case study.

### ➤ *Specific Objectives*

- To identify the types of digital and technological tools adopted by Hadiid Industries Group.
- To assess the impact of technology adoption on operational efficiency.
- To examine the effect of digitalization on project performance and organizational growth.
- To explore employee and management perceptions regarding technology adoption.
- To identify challenges and enabling factors influencing effective technology use.

### ➤ *Research Hypotheses*

- H1: Technology adoption has a significant positive effect on operational efficiency.
- H2: Digitalization positively influences project performance in the construction sector.
- H3: Technology use is positively associated with organizational growth and competitiveness.

### ➤ *Conceptual Framework*

A conceptual framework that clarifies the connection between digitalization and technology adoption, operational effectiveness, and the growth of the construction industry serves as the foundation for this investigation. According to the framework, using technology leads to better efficiency-related results, which enhance sector performance and sustainability.

## III. LITERATURE REVIEW

### ➤ *Concept of Digitalization and Technology in Construction*

By enhancing productivity, coordination, and project performance, digitalization and technology have progressively changed the construction sector. Construction companies can improve planning accuracy, cost control, and decision-making by utilizing digital tools such project management systems, contemporary construction equipment, integrated information systems, and communication technologies (Eastman, Teicholz, Sacks, & Liston, 2011; Succar, 2009). Adoption of technology lowers operational inefficiencies and promotes timely project delivery, according to earlier research (Oesterreich & Teuteberg, 2016). [2-6]

### ➤ *Technology Adoption in the Construction Industry*

Technology adoption in the construction industry is influenced by organizational readiness, perceived benefits, cost, and technical capability (Rogers, 2003; Brynjolfsson & Hitt, 2000). According to research, organizations that successfully incorporate digital technologies see increased productivity, resource utilization, and competitiveness. However, the construction industry is frequently characterized by sluggish acceptance due to reluctance to change and talent gaps (Love, Edwards, & Irani, 2009). [1-5]

### ➤ *Digitalization and Operational Efficiency*

Operational efficiency is a significant benefit of digitization in construction. Empirical research regularly reveal a favorable correlation between technology use and efficiency indicators like as cost savings, time management, and coordination (Oesterreich & Teuteberg, 2016). Integrated digital systems provide real-time information sharing, reducing errors and improving overall project performance (Succar, 2009). [4-6]

### ➤ *Digitalization and Construction in Developing and Post-Conflict Contexts*

In underdeveloped and post-conflict countries, particularly Somalia, the use of digital technologies in building remains restricted. Existing literature indicates issues such as inadequate infrastructure, a lack of technical skills, and financial limits (World Bank, 2020). Furthermore, empirical research on Somalia's construction sector is limited, with few studies adopting mixed-methods approaches to capture both performance outcomes and stakeholder experiences.

➤ *Research Gap*

This study fills these gaps by investigating the role of digitalization and technology in improving operational

efficiency and boosting construction industry development in Somalia through a mixed-methods case study of Hadiid Industries Group.

Table 1 The Alignment Between Research Objectives and Data Collection Methods

Objective	Method
Identify Technologies Used	Surver & Interviews
Measure Efficiency Impact	Questionnaire
Explore Perceptions	Interviews
Identify Challenge	Interviews

**IV. RESEARCH METHODOLOGY**

➤ *Research Design*

The study adopts a convergent parallel mixed-methods design, in which quantitative and qualitative data are collected concurrently and evaluated separately before being combined for interpretation (Creswell and Plano Clark, 2018). Quantitative data captures measurable links between digital technology adoption and operational effectiveness, whereas qualitative data investigates employee and manager perspectives, experiences, and obstacles. This design is suitable for studying complex phenomena such as technology

adoption in the construction industry, particularly in developing and post-conflict settings (Tashakkori & Teddlie, 2010). [9-12]

➤ *Explanation*

• *Quantitative Approach*

- ✓ 15 employees complete structured questionnaires.
- ✓ Focus: technology adoption (including ERP systems) and operational efficiency.

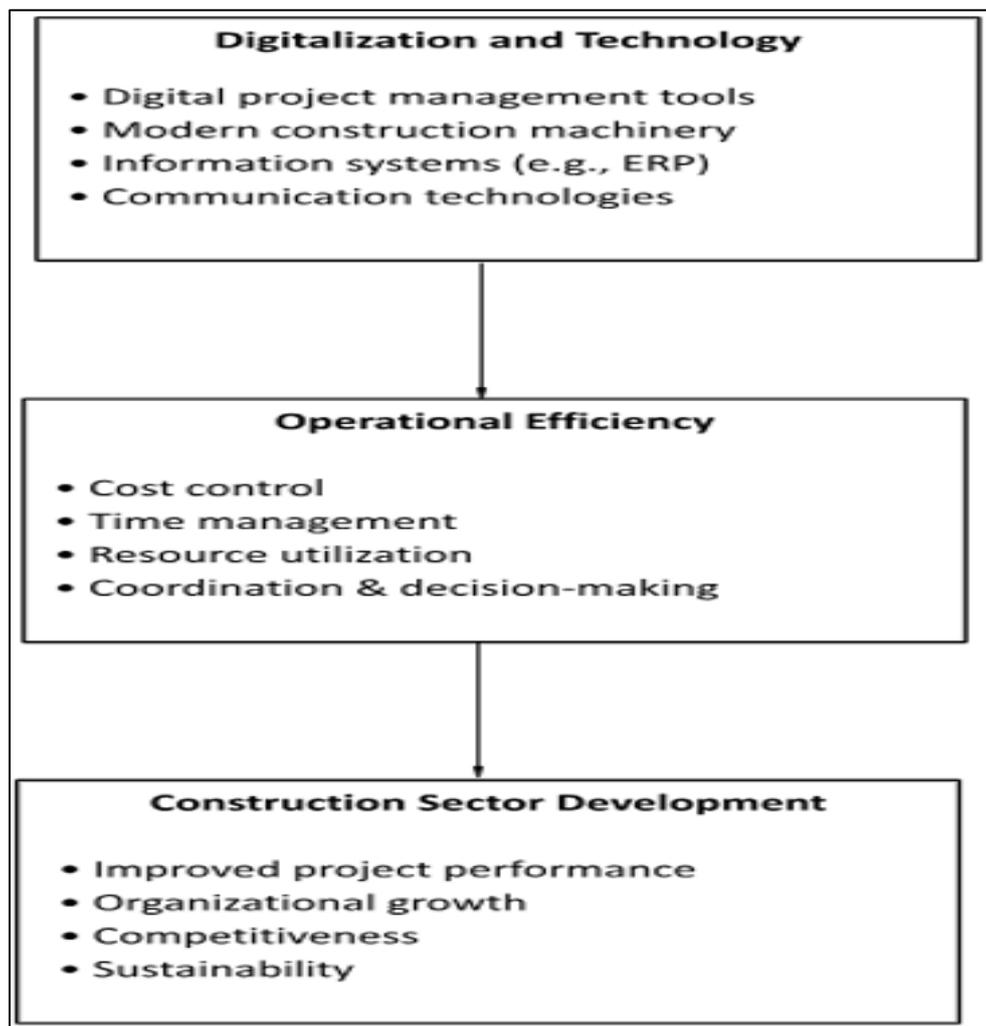


Fig 1 Presents the Conceptual Framework Illustrating the Relationship Between Digitalization and Technology, Operational Efficiency, and Construction Sector Development

- *Qualitative Approach*

- ✓ 3 managers participate in semi-structured interviews.
- ✓ Focus: challenges, perceptions, and insights on technology adoption and sector development.

- *Integration & Interpretation*

- ✓ Triangulates results from both datasets.
- ✓ Provides comprehensive insights into efficiency improvements and sector development.

- *Conclusions & Recommendations*

- ✓ Evidence-based suggestions for Hadiid Industries Group and the broader Somali construction sector.

- *Study Population and Sampling*

The research sample includes Hadiid Industries Group personnel and managers who are directly involved in construction operations and technology use. This comprises employees who use digital tools, ERP systems, and other construction technologies in their regular work. The group was chosen because they had direct experience with technology adoption and its impact on operational efficiency.

For the quantitative component, 15 individuals were chosen using stratified random sampling to ensure representation from several areas, including project management, operations, sales, marketing, and finance (Etikan, Musa, & Alkassim, 2016). [10] This strategy ensures that the sample represents the structure of the organization while reducing selection bias.

For the qualitative component, three managers were chosen using purposive sampling. These managers were chosen because they have direct management of construction activities and participate in technology adoption decisions. Purposive sampling ensures that interviews yield in-depth perspectives from experienced workers who can identify organizational difficulties and rewards associated with technology implementation.

- *Data Collection Methods*

Structured questionnaires are used to obtain quantitative data, with Likert-scale items measuring digital technology adoption, operational efficiency, and perceived benefits. These quizzes are aimed at employees who use technology in their regular work.

Semi-structured interviews with managers, engineers, and supervisors are used to collect qualitative data about technology adoption and ERP systems, including experiences, issues, and perceptions. Combining these methodologies enables triangulation, which improves the validity and dependability of findings (Creswell, 2014).[9]

- *Research Variables*

This study looks at the link between digitalization and technology adoption, operational efficiency, and construction sector development. The variables are classed as independent, mediating, or dependent.

Digitalization and technology adoption are the independent variables, and they include the usage of digital tools, ERP systems, contemporary construction machinery, and communication technologies. This variable denotes the level of technological integration within Hadiid Industries Group.

The mediating variable is operational efficiency, which measures the organization's capacity to allocate resources, reduce expenses, manage time effectively, and coordinate operations efficiently. The use of digital technologies and ERP systems influences operational efficiency.

The dependent variable is construction sector development, measured by project performance, organizational growth, competitiveness, and sustainability. This variable represents the outcomes of technology adoption and improved operational efficiency in the Somali construction context.

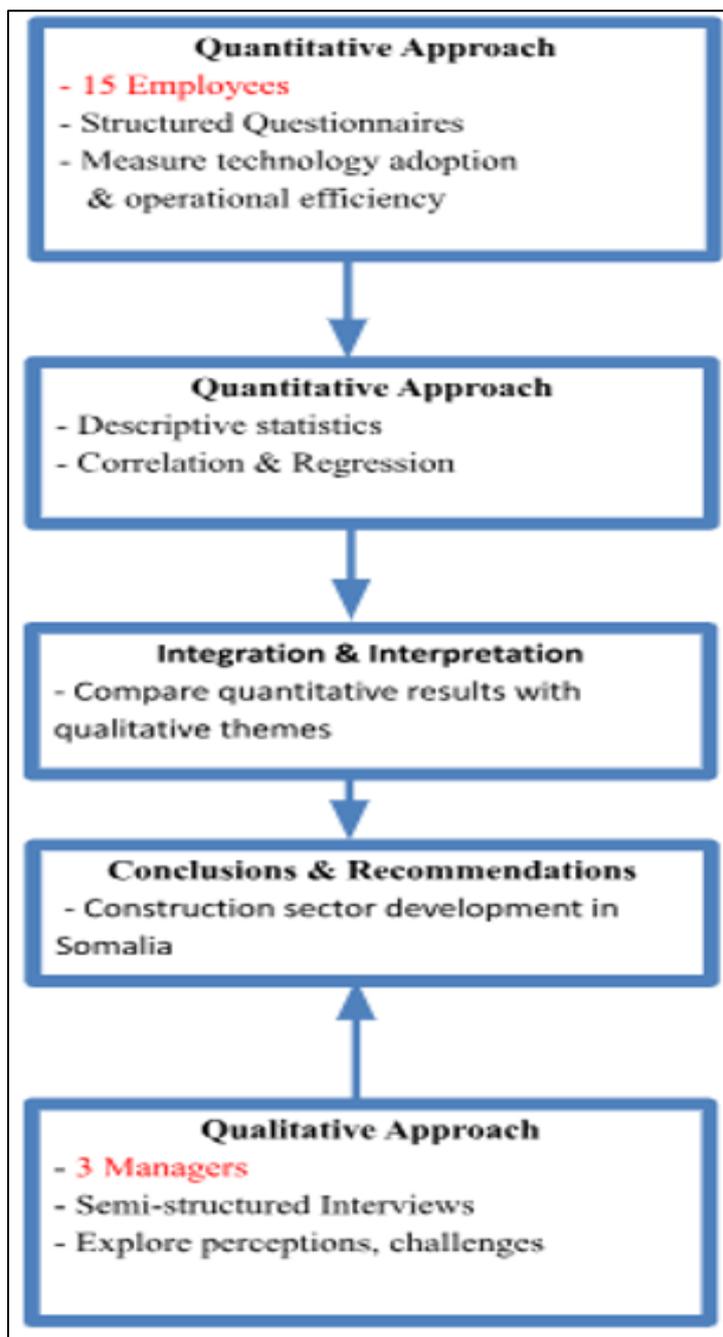


Fig 2 Quantitative Data Collection, Quantitative Analysis” and “Qualitative Data Collection, Qualitative Analysis

Table 2 Study Population and Sample Size

Category	Population size	Sample size	Sampling method	remarks
Employees	50	15	Stratified random	Across Departments: sales, finance, marketing, project management
Managers	5	3	purposive	Senior manager directly involved in technology adoption

Table 3 Operational Definition of Variable

Variable	Type	Measurement Indicators	Source
Digitalization & Technology Adoption	Independent	-Use Of ERP System- Adoption Of Digital Tools – Modern Machinery- Communication Technologies	Eastman Et Al., 2011: Succar, 2009
Operational Efficiency	Mediating	-Cost Reduction- Time Management- Resource Utilization- Coordination	Oesterrich & Teuteberg, 2016
Construction Sector Development	Dependent	-Project Performance- Organizational Growth- Competitiveness- Sustainability	World Bank, 2020; Love Et Al.,2009

➤ *Data Analysis*

To test hypotheses about the relationships between technology adoption and operational efficiency, quantitative data is analyzed using descriptive statistics such as mean, standard deviation, and frequency distribution, as well as inferential statistics such as correlation and regression (Sekaran & Bougie, 2016).[11]

Thematic analysis is used to examine qualitative data in order to uncover repeating patterns, perspectives, and issues associated with digitalization in the construction industry. Themes can be classified using either NVivo or manual coding. The quantitative and qualitative results are then combined to provide a full understanding of the findings.

➤ *Ethical Considerations*

Ethical standards are rigorously followed. All participants provide informed consent, confidentiality and anonymity are preserved, and data is only utilized for research reasons. Ethical considerations are critical, especially when collecting information from employees concerning organizational processes and technological adoption.

➤ *Limitations of Methodology*

The findings are specific to Hadiid Industries Group and may not apply to all construction firms in Somalia. Self-reported data may contain response bias, and access to specific employees or managers may be limited owing to operational schedules. Despite these limitations, the mixed-methods technique enables a thorough investigation of the study problem.

**V. RESULTS AND FINDINGS**

This section includes a study of data collected from Hadiid Industries Group's 15 employees and three managers. The study employs a mixed-methods approach, combining quantitative data from employee questionnaires with qualitative insights from manager interviews. The goal is to look into the effect of digitalization, namely ERP systems, in improving operational efficiency, productivity, and overall performance in the Somali construction sector.

➤ *Quantitative Data Analysis*

- *Demographic Profile of Employees*

Table 4 Demographic Profile of Employee

Characteristic	Category	Frequency	Percentage
Gender	Male	12	80%
	Female	3	20%
Department	Finance	2	13.3%
	Project Management	3	20%
	Marketing	2	13.3%
	Sales	3	20%
	Operations	1	6.7%
	HR	1	6.7%

Table 5 Mean Rating of Key Variable

Variable	Mean	Std. Deviation	Interpretation
Technology use	4.1	0.63	High
productivity	3.9	0.58	High
Performance	4.0	0.55	High
Challenges	3.2	0.70	Moderate

➤ *Technology Use, Productivity, Performance, and Challenges*

Employees were asked to rate the level of technology use, productivity, performance, and challenges on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 6 Correlation Analysis

variable	Technology use	productivity	performance	challenge
Technology use	1	0.78	0.81	-0.42
productivity	0.78	1	0.85	-0.38
performance	0.81	0.85	1	-0.45
challenge	-0.42	-0.38	0.45	1

➤ *Correlation Analysis*

A Pearson correlation was conducted to examine relationships between technology use, productivity, performance, and challenges.

➤ *Qualitative Data Analysis*

Three managers were interviewed to explore perceptions of technology adoption, ERP system usage, and its impact on operations and sector development.

• *Theme 1: Benefits of Technology Adoption*

Managers highlighted that digital tools and ERP systems improve coordination, reduce errors, and enhance reporting. One manager stated: "With ERP, we can track project timelines and costs accurately, which helps avoid delays and optimize resources."

• *Theme 2: Challenges in Technology Use*

Managers identified barriers, including employee resistance to change, insufficient technical training, and the high cost of modern equipment.

• *Theme 3: Impact on Sector Development*

Managers emphasized that technology adoption supports growth, competitiveness, and sustainability, aligning operations with international construction standards and improving project outcomes.

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➤ *Integration of Quantitative and Qualitative Findings*

The quantitative data show high levels of technology adoption, productivity, and performance, with moderate obstacles. These findings are explained by qualitative insights: managers agree that ERP systems and digital technologies boost efficiency, but they also point out challenges such as limited skills and equipment expenses. Overall, the findings indicate that digitization improves operational efficiency and adds to sector development, although focused interventions are required to solve difficulties.



Fig 3 Conceptual Integration of Findings

## VI. DISCUSSION

The goal of this study was to look into the influence of digitalization and technology adoption, namely ERP systems, in improving productivity, performance, and construction sector development at Hadiid Industries Group. The study took a mixed-methods approach, gathering quantitative data from 15 employees and qualitative views from three managers.

### ➤ *Technology Use and Productivity*

The quantitative results demonstrate that employees regarded technology use highly (mean = 4.1), as well as productivity (mean = 3.9). The high positive association ( $r = 0.78-0.81$ ) shows that technology adoption improves productivity and performance. These findings support earlier research indicating that digital tools and ERP systems improve workflow efficiency and production in construction operations (Eastman et al., 2011; Succar, 2009). [2-6]

Managers' qualitative observations confirmed this, emphasizing the benefits of ERP systems, including real-time monitoring, improved coordination, and reduced errors. Managers also reported increased productivity in project tracking, resource allocation, and timely decision-making.

### ➤ *Challenges in Technology Adoption*

Despite the strong adoption, obstacles were scored modestly (mean = 3.2). Managers identified difficulties such as low technical skills, opposition to change, and excessive equipment expenses. This is consistent with previous studies showing that organizational and human variables can restrict the full benefits of technology adoption (Oesterreich & Teuteberg, 2016). [4]

### ➤ *Impact on Construction Sector Development*

According to the report, increasing technology adoption and enhanced operational efficiency help to develop the construction sector, as assessed by project performance, organizational growth, competitiveness, and sustainability. The combination of research demonstrates that technology can promote sector development if constraints are handled.

## VII. CONCLUSION

This study concludes that:

- Digitalization and technology adoption significantly enhance operational efficiency, productivity, and performance at Hadiid Industries Group.
- ERP systems and digital tools are the primary technologies driving improvements in coordination, resource utilization, and project management.
- Challenges, such as limited technical skills, resistance to change, and high costs, must be addressed to maximize the impact of technology on organizational performance.
- Construction sector development in Somalia can benefit from increased technology adoption, as improved efficiency and performance translate into competitiveness, growth, and sustainability.

- Overall, the study confirms that technology adoption is a key enabler for operational and sectoral development, but human and financial factors play a critical moderating role.

## VIII. RECOMMENDATIONS

Based on the findings, the study proposes the following recommendations for Hadiid Industries Group and the Somali construction sector:

### ➤ *Invest in Training Programs*

Develop continuous training and capacity-building initiatives for employees to enhance digital literacy and ERP system proficiency.

### ➤ *Upgrade Technology Infrastructure*

Ensure access to modern machinery and digital tools to maximize productivity and reduce operational challenges.

### ➤ *Promote Change Management*

Implement strategies to reduce resistance to technology adoption, including awareness campaigns, incentives, and participatory implementation processes.

### ➤ *Monitor and Evaluate Technology Impact*

Establish performance metrics to track the effectiveness of technology adoption on productivity, efficiency, and project outcomes.

### ➤ *Scale Technology Adoption in the Sector*

Encourage other construction firms in Somalia to adopt ERP systems and digital tools, facilitating sector-wide growth, competitiveness, and sustainability.

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