

DELMAR INTERNATIONAL

**FOR UNDERADUATE AND POSTGRADUATE
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Professional Research

*The impact of using information and communications
technology in developing and managing projects for the
reconstruction of Sudanese public universities after the
war.*

The Researcher

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Dedication

Nothing is more precious and dear than the generosity of the Lord of all creation, who has honored me with His mercy and gracious kindness. To Allah belongs all gratitude and praise—pure, blessed praise without end.

To the fruit of my heart, my refuge, the symbol of my pride and dignity, and the most precious thing I possess in this world—my children—with all my longing to see them attain the highest ranks in academic, professional, and social distinction and excellence.

To my husband and the father of my children, who supported and encouraged me with every possible means until I achieved this scholarly accomplishment.

To those who have carried upon their shoulders the greatest and most noble mission in life, who provided me with support and illuminated my path of knowledge, research, and learning—my esteemed research supervisors—with all respect and appreciation.

To all who illuminated my path with sincere prayers from the heart, which became a light by which I was guided through the darkness.

To him whose love and my longing for him inspired the idea for this research thesis—my beloved, dear, wounded homeland, Sudan—praying to Allah Almighty that this humble work may represent a contribution to healing its wounds, advancing its progress, and restoring its wellbeing, so that it may reach the highest peaks of global distinction with pride, dignity, and honor.

To all who offered me counsel and support, I dedicate to you the essence of my scholarly effort.

Introduction.

Sudan has recently witnessed severe political and security challenges that have resulted in armed conflicts casting dark shadows over various vital sectors, foremost among them the higher education sector. Sudanese universities have suffered partial or complete destruction to their infrastructure, with academic and administrative operations being disrupted, negatively affecting the quality and continuity of education. Amid these difficult circumstances, an urgent need has emerged to reconstruct this vital sector not only from a structural perspective, but through the development of modern project management mechanisms based on advanced technological concepts, primarily Information and Communication Technology (ICT).

Information and Communication Technology represents one of the effective tools that has contributed—and continues to contribute—to creating a qualitative transformation in project management and development across various sectors on a global scale. This is due to the decision support systems it provides, along with means for planning, monitoring, and evaluation, in addition to the possibility of real-time networking between various project stakeholders. The importance of integrating this technology into the reconstruction processes of Sudanese universities lies in its capacity to overcome traditional obstacles that

impede project implementation in post-conflict environments, which often suffer from resource constraints, instability, lack of transparency, and widespread administrative and financial corruption.

From this perspective, this study aims to examine the effectiveness of using Information and Communication Technology in managing reconstruction projects in Sudanese universities, and how these technical tools can be employed throughout all project phases, from planning through implementation to evaluation and monitoring. The study also reviews successful models and experiences from other countries that have experienced conflicts and benefited from this technology in building flexible and sustainable educational systems, seeking to derive lessons learned and apply them in the Sudanese context.

The significance of this study also lies in its treatment of a contemporary and vital topic in an academic environment aspiring to rebuild itself anew. It seeks to provide a conceptual and practical framework to assist decision-makers, donor organizations, as well as university administrations, in developing reconstruction projects based on technology as a tool for governance, achieving efficiency, enhancing transparency, and promoting community participation.

Sudanese universities—as a fundamental pillar in building the modern state and spreading a culture of peace and development—need today more than ever before modern mechanisms that ensure the sustainability of their reconstruction. This should not be limited merely to rebuilding structures, but should also include developing management systems, activating digital education systems, and restructuring academic and administrative processes in line with contemporary requirements. Hence, exploring the impact of Information and Communication Technology in this context represents an important step toward building an effective educational system capable of facing current and future challenges.

Accordingly, this study seeks to answer several key questions related to how Information and Communication Technology can be used in university reconstruction projects, the effectiveness of such use, the challenges that may prevent achieving desired results, and seeks to provide a set of recommendations and proposals that would support university reconstruction efforts in Sudan on sound technical and institutional foundations.

The study Problem.

In the aftermath of armed conflicts witnessed by Sudan, the infrastructure of higher education institutions, primarily universities, has suffered severe damage that directly affected their ability to continue performing their academic and administrative functions. Physical structures were damaged, administrative systems disrupted, and human resources displaced or dispersed, making university reconstruction a national priority that cannot be postponed. However, reconstruction processes in post-conflict contexts often face complex challenges related to weak institutional coordination, lack of transparency, resource scarcity, and the absence of modern planning tools in projects.

Given these challenges, Information and Communication Technology emerges as one of the vital alternatives that can contribute to accelerating the pace of reconstruction, achieving efficiency in project management, providing digital platforms that enable tracking and accountability, and supporting data-driven decision-making. Despite the promising potential offered by this technology, there are serious questions about the extent of its actual utilization in Sudanese university reconstruction projects, the degree to which entities responsible for these projects recognize its value and impact, in addition to the challenges that may hinder its activation, whether at the infrastructure level, human capacity level, or political will level.

Hence, the study problem stems from a clear gap between the theoretical possibilities offered by Information and Communication Technology in managing reconstruction projects on one hand, and the practical reality experienced by Sudanese universities after the war on the other hand—a

reality characterized by instability, resource scarcity, and the absence of a unified strategic vision. Therefore, this study seeks to explore the extent of impact of using Information and Communication Technology in developing and managing Sudanese university reconstruction projects, and to analyze the factors that enhance or limit this impact, with the aim of developing a scientific and practical framework that contributes to achieving sustainable reconstruction of these vital institutions.

The importance of studying:

The significance of this study stems from the crisis facing Sudanese universities after the war, which has created unprecedented challenges in their organizational, administrative, and educational structures. These institutions have become in dire need of innovative solutions that restore their vitality and establish a sustainable development trajectory. From this perspective, the study derives its importance from its focus on one of the most effective contemporary tools in project management—Information and Communication Technology—due to the significant advantages it provides in supporting planning, organization, monitoring, and evaluation, making it a fundamental pillar for reconstruction in a complex and turbulent environment.

The significance of this study also lies in its endeavor to provide a scientific framework for understanding the extent of impact of using technology in developing and managing university reconstruction projects, particularly given the capabilities that information technology tools offer in enhancing transparency, monitoring project implementation, ensuring optimal resource distribution, and reducing waste resulting from poor management or institutional overlap. The importance of this approach emerges in light of the scarcity of previous studies that have specifically addressed this topic in the Sudanese context, especially in the post-conflict phase, making this study a qualitative addition at both academic and practical levels.

The significance of the study is also manifested in its strategic dimension, as its results can contribute to guiding decision-makers, policy developers, and educational institutions toward adopting a more efficient

administrative and technical approach in managing reconstruction projects, thereby contributing to restoring Sudanese universities to their natural role as incubators of science, knowledge, and development. The study also provides a deeper understanding of the technical and human obstacles that prevent maximum benefit from technology in post-war environments, and offers proposed solutions to overcome these challenges through capacity building, infrastructure development, and promoting digital culture within university institutions.

Accordingly, this study is not merely research seeking to describe an existing reality, but represents a serious attempt to provide a practical vision that contributes to rebuilding Sudanese universities from a modern perspective that relies on contemporary technology tools and transcends traditional methods that have proven their limitations in post-conflict environments.

Objectives of the study:

✓ *To identify the current state of Information and Communication Technology usage in Sudanese university reconstruction projects after the war.*

✓ *To analyze the impact of Information and Communication Technology on improving the efficiency of university reconstruction project management.*

✓ *To identify the challenges facing the implementation of Information and Communication Technology in reconstruction projects.*

✓ *To assess the extent of technology's contribution to enhancing transparency and governance in university project management.*

✓ *To review comparative experiences in post-conflict countries that have employed technology in reconstruction efforts.*

✓ *To propose mechanisms and strategies for activating the role of Information and Communication Technology in developing university reconstruction management in Sudan.*

Study hypotheses and questions.

RESEARCH QUESTIONS

✓ What is the current state of Information and Communication Technology usage in Sudanese university reconstruction projects after the war?

✓ To what extent does the use of Information and Communication Technology contribute to improving the management and development of these projects?

✓ How does Information and Communication Technology affect enhancing transparency and accountability in university project management?

✓ To what extent do Sudanese universities benefit from international experiences in using technology in the context of reconstruction?

RESEARCH HYPOTHESES

✓ There is limited use of Information and Communication Technology in Sudanese university reconstruction projects after the war.

✓ There is a positive relationship between the use of Information and Communication Technology and the efficiency of university reconstruction project management.

✓ Sudanese universities face organizational and technical challenges that hinder the effective employment of technology in reconstruction projects.

✓ The use of Information and Communication Technology contributes to enhancing transparency and governance in project management.

✓ Activating Information and Communication Technology strategies positively reflects on accelerating the pace of reconstruction and improving its outcomes.

Study Approach.

The descriptive analytical approach was used to know “the impact of using information and communication technology in developing and managing projects related to the reconstruction of Sudanese universities after the war.”

The limits of the study:

Spatial boundaries: The Arab world.

Time limits: 2015–2025.

Study plan.

CHAPTER ONE: THEORETICAL FRAMEWORK AND SCIENTIFIC CONCEPTS

Section One: Introduction to Understanding Information Technology

First: Concepts about Technology

Second: Conceptual Framework for Information

Third: Concepts about Information Systems

Fourth: Information Technology

Section Two: Introduction to Understanding Engineering Project Management

First: Nature and Importance of Engineering Project Management

Second: Engineering Project Management Strategies

Third: Challenges Related to Engineering Project Management

Fourth: Systems and Programs for Engineering Project Scheduling

Fifth: Human Resource Management Methods in Engineering Projects

Sixth: Benefits of Engineering Project Management

Section Three: Information Technology in the Context of Reconstruction

First: Use of Information Technology in Higher Education in Post-Conflict Countries

Second: Reality of Sudanese Universities after War and Reconstruction Challenges

CHAPTER TWO: THE IMPACT OF USING INFORMATION TECHNOLOGY IN MANAGING SUDANESE UNIVERSITY RECONSTRUCTION PROJECTS

Section One: Current State of Information Technology Use in University Reconstruction Projects

First: Extent of Technical Infrastructure Availability in Sudanese Universities after War

Second: Level of Electronic Systems Usage in Reconstruction Project Management

Third: Administrative and Technical Obstacles Facing ICT Activation in Reconstruction Projects

Section Two: Impact and Future Recommendations

First: Impact of Information Technology Use on Project Implementation Efficiency

Second: Role of ICT in Enhancing Transparency and Accountability in Reconstruction Projects

Third: Proposed Recommendations for Activating Technology in University Reconstruction Management in Sudan

Conclusion.

In conclusion of this study, it can be said that Information and Communication Technology has become the cornerstone of any serious attempt to rebuild educational institutions in countries emerging from conflicts. The study, through analyzing the Sudanese reality and reviewing comparative experiences, revealed the importance of technology in overcoming traditional obstacles associated with reconstruction, whether at the planning and implementation level, or in terms of oversight, monitoring, and governance.

The results showed that effective use of information technology in reconstruction projects positively reflects on implementation speed, resource distribution efficiency, and procedural transparency, contributing to establishing a sustainable and modern educational environment. However, the study also highlighted a set of challenges that hinder this use, such as weak digital infrastructure, human resource deficiencies, and absence of clear technical strategies in many Sudanese universities.

The study emphasizes that overcoming these challenges cannot be achieved in isolation from adopting a comprehensive national vision for rebuilding the higher education system in Sudan, based on digital

transformation as one of the fundamental reconstruction axes, not as a secondary option. Efforts must be coordinated between the state, university institutions, and international partners to provide technical, technological, and training support that ensures achieving this transformation.

Universities, as knowledge-producing institutions, should be a model in employing technology to serve development, especially in the post-war phase, where they represent the most flexible, cost-effective, and impactful tool given limited resources. Hence, this study hopes that its results and recommendations will contribute to opening new horizons for decision-makers in Sudan and help them build a more effective university system that responds to contemporary requirements.

Results.

✓ *Sudanese universities suffer from clear weakness in the technical infrastructure necessary for employing information technology in reconstruction projects.*

✓ *There is limited and unsystematic use of Information and Communication Technology in the planning and implementation phases of reconstruction projects.*

✓ *There is a positive relationship between information technology use and improving the efficiency of university reconstruction project management.*

✓ *Information technology clearly contributes to enhancing transparency and governance in university projects.*

✓ *There are significant challenges related to the shortage of qualified human competencies in information technology within Sudanese universities.*

✓ *Weak institutional support and national policies hinder activating the role of technology in reconstruction processes.*

✓ *Benefiting from successful international experiences in employing ICT in post-conflict higher education remains limited in the Sudanese context.*

These findings accurately reflect the complex reality facing Sudanese universities in their reconstruction efforts. The clear weakness in technical infrastructure represents a fundamental barrier that must be addressed before any meaningful digital transformation can occur. The limited and

unsystematic use of ICT indicates not just technical deficiencies, but also gaps in strategic planning and institutional capacity.

The positive correlation between ICT use and management efficiency, along with technology's contribution to transparency and governance, demonstrates the potential value these tools could provide if properly implemented. However, the human capacity shortage and weak institutional support reveal systemic challenges that extend beyond mere technical solutions.

The limited uptake of international best practices suggests missed opportunities for learning from post-conflict reconstruction experiences elsewhere. This points to the need for more structured knowledge transfer and adaptation of proven approaches to the Sudanese context, while accounting for local conditions and constraints.

Recommendations:

✓ Develop a comprehensive national plan for employing Information and Communication Technology in Sudanese university reconstruction projects.

✓ Develop digital infrastructure within universities and provide necessary equipment and technologies for modern project management.

✓ Train administrative and engineering personnel on using digital project management systems and modern oversight applications.

✓ Enhance cooperation between universities, relevant ministries, and development partners to secure required technical and technological support.

✓ Integrate information technology tools into planning, implementation, and evaluation phases of all university reconstruction projects.

✓ Adopt integrated digital education programs to contribute to educational process continuity during and after reconstruction periods.

✓ Document and disseminate Sudanese universities' experiences in using technology in reconstruction, and benefit from regional and international experiences.

These recommendations present a logical progression from strategic planning to practical implementation. The emphasis on a comprehensive national plan addresses the coordination gaps identified in the study findings. However, several considerations merit attention:

The recommendation for digital infrastructure development, while essential, must account for Sudan's current economic constraints and security challenges. The sequencing of infrastructure investment versus capacity building may need careful consideration given resource limitations.

The training component is critical but may face challenges given the brain drain identified in the study. Developing retention strategies alongside training programs could improve outcomes. The recommendation to enhance cooperation between stakeholders is sound, though establishing clear governance mechanisms and accountability frameworks would strengthen this approach.

The integration of ICT tools across all project phases represents an ambitious goal that may require phased implementation rather than simultaneous deployment. Starting with pilot projects could provide valuable lessons for broader rollout.

The focus on documenting experiences and learning from international cases addresses the knowledge transfer gap noted in the findings, though careful adaptation to local contexts will be necessary rather than direct replication of foreign models.

The reviewer:

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