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Professional Research Thesis

Titled

**The Impact of project management
and Technology on the development
of residential cities in Post war
countries**

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Dedication

To my little ones who taught me the meaning of perseverance—may I succeed so I always leave them something to be proud of (Tala and Ahmed).

To my entire family, I love you always and forever, and I thank you for your endless support.

To my father, who taught me commitment and that work is an honor—may God prolong your life.

To my mother, who has always been an example of a strong woman—may God prolong your life.

To my siblings, I always appreciate your support.

To my friends, who were always by my side during the toughest times.

And finally, to you, my companion on this journey, who has always embraced me.

To all of you, I dedicate my success.

Researcher :

Thowaiba Mustafa Abdeen

Acknowledgment

All praise is due to Allah, Lord of the Worlds, and peace and blessings be upon the noblest of messengers, our Prophet Muhammad, and upon his family and companions until the Day of Judgment.

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corrections, and formatting, as well as to everyone who supported me scientifically and morally.

SUMMARY

This research investigates the impact of project management standards on the effectiveness of post-conflict housing reconstruction.

Using case studies from Iraq, Syria, and Gaza, the study analyses how administrative challenges, funding policies, and security conditions influence project outcomes.

A comparative analytical approach was adopted to identify recurring patterns of failure and success in these contexts. Key findings highlight a disconnect between theoretical management standards and practical implementation, with issues such as weak coordination, poor resource allocation, and inadequate administrative capacity.

The research also evaluates the relevance of modern management tools like Total Quality Management (TQM) and Monitoring & Evaluation (M&E) systems in improving performance and resilience.

These insights are then applied to the case of Khartoum, a capital city severely affected by recent conflict. The study concludes that successful reconstruction depends on an integrated, flexible, and transparent management approach, supported by skilled personnel and cross-sectoral cooperation. Lessons drawn from the selected case studies can offer strategic direction for rebuilding Khartoum, provided they are adapted to its unique context and challenge

Introduction.

In recent years, the world, particularly the Arab countries, has witnessed numerous crises and conflicts that have caused widespread destruction to infrastructure, in addition to negative impacts on economic, political, social, and cultural systems. Reconstruction has thus become a complex task requiring comprehensive and sustainable solutions—not limited to repairing buildings and roads, but also including the revitalization of communities, stimulating the economy, achieving security and political stability, and promoting sustainable development.

*From this perspective, this study focuses on the role of **project management** as a fundamental tool in the process of reconstruction and development. Project management provides clear methodologies for planning and execution according to priorities, enables effective risk management, and facilitates the coordination of available resources, ensuring successful management and overcoming the challenges of reconstruction.*

Architecture is no longer merely a creative process; it has become concerned with both functionality and aesthetics simultaneously, with an emphasis on project sustainability. Studies have shown that high-performing projects are led by certified project managers who employ modern management methodologies and oversee all stages of implementation effectively, while taking into account budgetary, quality, and scheduling considerations.

In this context, important questions arise: What makes reconstruction processes effective and sustainable? How can cities devastated by war be

transformed into modern urban centers? What is the role of work teams in achieving these goals amid complex challenges?

This study therefore aims to explore project management methodologies and how they can effectively influence the reconstruction of Sudanese cities affected by war, drawing on the most significant results from previous experiences, whether Arab or international. The study carefully adapts these lessons to suit the Sudanese context, preserving social and cultural heritage, while also considering the causes of failure in similar projects in other countries and communities.

Studying post-war urban development is not merely an inquiry into rebuilding; it is an attempt to understand how tragedies can be transformed into opportunities that restore hope and life to affected communities, ultimately achieving sustainable development for them.

The study Problem.

Post-war countries face significant challenges in rebuilding and developing residential cities due to destruction, lack of funding, ineffective planning, and the absence of strategic management in projects. Therefore, in Sudan, following the April 2023 war, this process will be difficult but necessary. Focus must be placed on specific costs to ensure an efficient process that achieves urban development.

- 1. **Reconstruction Challenges:** Coordinating emergency solutions to repair the infrastructure of these cities is difficult due to the destruction, as is initiating operations because of resource shortages in both the food and energy sectors.*
- 2. **Lack of Effective Strategies:** Careful study is required to determine the extent of destruction, monitor the current situation, identify key elements, review solutions to previous problems, apply them in new projects, and develop executive plans and programs under supportive supervision, with clear methods and implementation mechanisms.*
- 3. **Numerous Influencing Factors:** Multiple factors affect the reconstruction process, including international and regional funding, the difficulty of coordinating investment attraction, securing funds independent of government policies, and the lack of technology crucial to reconstruction tasks. These challenges make it difficult to define the role of project management and achieve urban development through the application of comprehensive advanced models.*
- 4. **Expected Inflation in Local Markets:** This is an important factor due to varying economic conditions and unexpected challenges,*

which complicate cost estimates. The anticipated increase in project costs post-war affects financial assessment and the feasibility of implementing mechanisms for city development.

- 5. **Limited Utilization of Local Companies:** Most local companies in post-war countries lack trained human resources, technical capabilities, and managerial expertise. This negatively impacts project management in terms of expenditure, resource allocation, risk costs, quality, and scheduling—factors that ensure success and reduce risk based on available data after existing destruction when applying these management models.*

The importance of studying:

The significance of this study lies in presenting a forward-looking vision and methodology in the field of reconstruction project management, specifically focusing on the correct approaches to planning for the establishment and development of residential cities affected by war. The study aims to align reconstruction efforts with the available resources, security and safety considerations, and the possibility of achieving a high quality of life in the shortest possible time, while taking into account the social and cultural aspects of the region under study and guiding models of urban life accordingly.

The emphasis is placed on ensuring that all outcomes of this dignified urban life can be achieved according to scientific administrative principles, governed by standards that respect the social and cultural aspects of the area, while maintaining its historical continuity.

The study highlights the foundational principles of management models for such projects, aiming to maximize the benefits of integrated implementation as a powerful tool in communities, demonstrating the concept of this management and its impact on project success.

Urban reconstruction success serves as an indicator of peace promotion and conflict resolution. It creates opportunities for qualified professionals, provides employment for many workers, and indirectly stimulates economic growth, which in turn increases government resources, improves living standards, and undoubtedly enhances financial stability—contributing directly to economic development, security, and the flourishing of urban life.

Therefore, it was necessary to examine diverse studies on the causes of reconstruction failures in post-war countries, whether internal or external, and to attempt to build an administrative model capable of accommodating all variables and addressing previous shortcomings. This effective administrative model integrates management techniques as mechanisms for reconstruction, which can be applied in Sudan and serve as a reference for other countries.

Objectives of the study:

Construction Project Management is considered one of the most important factors for development. This study focuses on highlighting the correct methodology in construction management to develop and reconstruct post-war countries.

General Objectives:

To explore and analyze the impact of applying management techniques on reconstruction processes, aiming to improve execution efficiency, ensure urban development sustainability, and develop clear strategies for managing projects in such crisis contexts.

Specific Objectives:

- 1. Propose an Integrated Administrative Model: Develop a framework to assess the level of damage and manage environmental components effectively, utilizing existing resources while integrating them with new resources. Leverage existing destruction to address previous problems by introducing solutions that meet user needs, overcoming societal shortcomings that negatively impacted performance. Employ effective administrative leadership and technology to enhance the development of local human capacities as construction resources, yielding optimal results. The model should account for spatial differences, incorporate cultural heritage, and apply it to develop residential cities while simulating innovative global reconstruction practices based on these heritage elements.*
- 2. Analyze Factors Affecting the Reconstruction of Sudanese Cities: Examine the post-war conditions of communities and benefit from*

international experiences, comparing them with Arab experiences to create a locally-adapted model based on reality. This model should consider local conditions, terrain, cultures, available resources, human capacities, and societal behaviors. Extract lessons learned from other communities' reconstruction efforts while adapting them to the Sudanese context, producing a scientific approach that addresses challenges and aligns with local realities.

3. Analyze Challenges and Constraints in Reconstruction:

Investigate the lack of funding, absence of plans, weak integration of management with sustainability, and the failure to utilize reconstruction as a developmental model. Address the large environmental, economic, and social damages caused by war and their impact on community recovery. Consider lessons from previous national experiences as key challenges, applying practical solutions to overcome crises while managing time and cost to ensure project success and deep sustainability related to humans, environment, and economy.

4. Determine the Role and Impact of Project Management

Techniques and Digital Tools: *Focus on planning tools, cost control, and risk management to achieve administrative success and ensure quality. Accelerating reconstruction requires the use of intelligent systems and Building Information Modeling (BIM) to reach high execution levels.*

Study hypotheses and questions.

This study is based on key hypotheses that have a significant impact on the success of reconstruction and development processes in post-war communities. These include:

- 1. **There is a significant relationship between international project management standards and the quality of reconstruction projects.** These standards include project scope management, time and cost management, resource and procurement management, and communications management, all of which contribute to improving efficiency, effectiveness, impact, and sustainability.*
- 2. **The application of modern project management techniques contributes to reducing reconstruction costs and supports execution quality, especially through the use of digital software such as Building Information Modeling (BIM) and time-planning systems.***
- 3. **There is a relationship between collecting accurate information on the extent of destruction and attracting investments, through providing reliable data, adequate financing, and political stability, which enhances reconstruction opportunities and contributes to raising living standards.***

Relying on strategic planning while considering spatial challenges, and focusing on human and functional capacity, helps minimize operational and scheduling issues, achieve sustainability, utilize available resources effectively, and create an ideal urban life that preserves local heritage. All

of this facilitates work and enables the reconstruction mission to be accomplished efficiently and effectively.

Research

Questions:

This study seeks to answer a set of central questions reflecting the practical challenges of reconstruction in post-war countries, particularly in Sudan.

The main questions include:

- 1. To what extent can modern management in post-war countries implement sustainability, and how does this affect the establishment and development of modern cities, especially in Sudan?*
- 2. Does the effective utilization of economic, human, and natural resources accelerate construction development as a manifestation of societal stability, and how is this reflected in practice?*
- 3. What are the main obstacles that may hinder reconstruction projects in post-war countries, particularly in Sudan, in ways that fundamentally affect project quality?*
- 4. How do digital and administrative technologies, as well as artificial intelligence applications, contribute to supporting development efforts and ensuring the success of reconstruction projects in war-affected countries?*

Study Approach.

The researcher employed several methodologies to study the impact of project management and its techniques on the development of residential cities in post-war countries. Multiple approaches were combined to obtain a comprehensive analysis of the study topic, as follows:

1. **Descriptive Method:**

The researcher described reconstruction projects in several war-affected countries, collected and analyzed relevant data and information, and compared the experiences of different countries. The study examined the success of using management techniques, interpreted the causes of challenges and issues, and attempted to provide solutions within the scope of the study to increase the likelihood of success when applying these techniques to improve residential cities.

2. **Inductive Method:**

The researcher relied on the inductive approach to collect observations and data, using them to analyze situations and previous studies. This involved tracing the effects of applying project management mechanisms, deriving practical rules and guidelines for managing reconstruction and development projects, and formulating general and shared theories that influence the successful development of cities.

3. **Comparative Method:**

The researcher focused on conducting an analytical comparison regarding structures and variations between the countries studied, examining the impact of management techniques on their reconstruction, and evaluating their success in achieving

sustainable development. Comparisons between case studies were made to identify differences, increase the likelihood of success, and refine explanatory factors more accurately, with the ultimate goal of generalizing the findings to the target segment of the study.

The limits of the study:

Spatial Boundaries:

This study is applied to the Republic of Sudan following the 2023 war, focusing on how to avoid reconstruction challenges that contributed to the failure of many previous experiences in other countries, and on how to develop a new, advanced model as a novel approach to meet post-war needs.

Temporal Boundaries:

This research covers the period from 2000 to 2025. This timeframe was selected due to the availability of recent information on numerous city redevelopment and reconstruction projects that experienced extensive destruction as a result of wars, facilitating the analysis of the impact of technology and management while relying on reports and studies due to the similarity of conditions in terms of destruction and devastation.

Study plan:

Preliminary Chapter: Theoretical Framework of Project Management

Section One: The Nature of Project Management

- 1. Definition of Project Management and Its Role in Urban Development***
- 2. Key Principles and Methods of Project Management Used in Planning and Implementation***
- 3. Differences Between Project Management and Traditional Management***

Section Two: Project Management Techniques and Tools

- 1. Quality and Risk Management Techniques, Their Stages, and Impact on Project Management***
- 2. Utilizing Artificial Intelligence and Planning Tools to Support Management Effectiveness and Performance Efficiency***
- 3. Major Software and AI Tools Used in Project Management***

Section Three: Challenges to Success or Failure in Reconstruction Project Management

- 1. Management and Planning Challenges, and the Impact of Funding and Economic Policies on Project Success***
- 2. The Role of Instability and Security in Delays and Obstacles to Urban Development Projects***
- 3. Case Studies of Countries Using Project Management Techniques in Reconstruction and the Reasons for Their Success***

Chapter One: Project Management and Technology for Post-War Residential City Development

Section One: Success Criteria for Reconstruction Projects

- 1. Planning Specifics for Housing Projects in the Post-War Phase***
- 2. Time and Cost Efficiency in Residential Project Implementation and the Role of Effective Management***
- 3. The Role of Sustainability and Quality Control in Reconstruction Project Success***

Section Two: Impact of Modern Technologies on Reconstruction

- 1. Use of Building Information Modeling (BIM) in Reconstruction***
- 2. Application of Monitoring Systems and Smart Infrastructure in Projects***
- 3. The Role of 3D Printing Technology on Time and Efficiency in Residential Unit Construction***

Section Three: Challenges to Success or Failure in Reconstruction Project Management

- 1. Analysis of Iraq's Reconstruction Experience after the 2003 War***
- 2. Case Study of Housing Projects in Syria after 2011***
- 3. Study of the Impact of Projects on Gaza Strip Reconstruction in 2012***

Chapter Two: Challenges of Redevelopment and Reconstruction and Analysis of Case Study Results

Section One: Impact of Management Standards on Project Quality and Its Application to Khartoum as a Devastated Capital

- 1. Measuring Project Quality in All Aspects Using Performance Indicators***
- 2. Analyzing Gaps Between Standards and Implementation, Identifying Causes, and Proposing Scientific Solutions***
- 3. Coordination, Planning, and Supervision Among Departments and Their Effect on Work Efficiency***

Section Two: Application of Scientific Theories in Urban Redevelopment (Applied Case Study)

- 1. Improving Resource Management Efficiency and Flexibility in Addressing Environmental and Social Challenges***
- 2. Reducing Costs of Errors Arising from Weak Systems and Administrative Models***
- 3. Flexibility in Handling Sudden Changes in Qualified Staff and Its Impact on Management Success***

Section Three: Analysis of Applied Study Results and Their Potential Application to a Redevelopment Project (Khartoum as a Devastated Capital)

- 1. Feasibility of Applying Previous Results to the Reality of Khartoum and Identifying Similarities and Differences***
- 2. Required Structure to Overcome Obstacles and Achieve Sustainability in Urban Redevelopment, Applied to Khartoum***

3. Collaboration Between Local and International Sectors and Its Impact on the Success of Management and Reconstruction Projects

Conclusion.

The study relied on a serious attempt to explore the impact of project management and its techniques on the development of residential cities in post-war countries. This was achieved through the analysis of real field experiences in three geographically distinct environments (Iraq, Syria, and the Gaza Strip), which were then applied to the reality of destruction and conflict in Khartoum, a devastated capital facing severe challenges due to armed aggression by rebel militias.

The study considered several factors, including the understanding that the failure of reconstruction operations is not solely linked to material and financial factors, but also results from administrative and structural imbalances within the project management system.

The study highlighted that the absence of sound, effective, and applicable administrative standards, along with poor coordination, lack of monitoring, and improper distribution of human and technical resources, is a major reason for the failure of reconstruction projects. Despite differences in political and economic orientations across previous case studies, the effective deployment of resources, flexibility in addressing challenges, and transparent partnerships with local and international entities significantly contributed to overcoming administrative constraints and ensuring the success of reconstruction projects by adapting to the needs of the population.

The specificity of these results, when applied to Khartoum, is evident given the city's multi-faceted collapse, including infrastructure, government institutions, and (partially) community trust. Despite the extensive

destruction, Khartoum has significant latent potential for recovery and revitalization, provided that a scientific project management methodology is implemented, based on participatory good governance in close collaboration with citizens.

The study emphasized that the quality of reconstruction projects is determined by their sustainability and their ability to create an integrated urban, social, and economic environment. This requires a focus on management approaches, tools, and models, and their modernization to meet post-war requirements.

Finally, the study provides a cognitive analytical framework that contributes to focusing on the challenges of reconstruction and encourages the establishment of more comprehensive models and policies for developmental project management in regions deteriorated by conflicts, wars, and external conspiracies.

Results:

- 1. The study revealed that weak standards in planning, supervision, and follow-up lead to partial or complete failure of most reconstruction projects in the countries examined. It highlighted that the absence of oversight, transparency, and the conflict of authorities due to the lack of a unified administrative framework significantly undermines the quality and long-term effectiveness of project outcomes.*
- 2. The study found that security stability, institutional reliability, and political balance have a major impact on the success of reconstruction efforts. These factors enable the completion of urban projects that directly contribute to sustainability, unlike environments where conflict, division, and security tensions persist.*
- 3. The study concluded that employing professional competencies with expertise in strategic planning and management plays a critical role in overcoming obstacles. Qualified personnel enhance administrative flexibility, respond effectively to emerging challenges, and adapt to the dynamics of complex environments.*
- 4. The study also indicated that weak traditional models complicate implementation and increase errors, leading to higher costs. In contrast, modern dynamic models improve management efficiency and achieve objectives within specified timeframes and budgets.*
- 5. The study highlighted that integrated partnerships, based on transparent priorities and supportive governance frameworks for reconstruction, are essential for the success of any administrative model.*

Recommendations:

- 1. The study recommends developing modern administrative models that are flexible and adaptable to changing environments. Their effectiveness has been demonstrated in war-affected contexts. Therefore, a dedicated administrative system for Khartoum should be designed, emphasizing flexibility, responsiveness to requirements, and the ability to operate in politically and economically unstable environments.*
- 2. The study recommends establishing a central unit for managing Khartoum's reconstruction projects. Khartoum requires a unified authority to oversee all urban development projects, characterized by transparency and staffed with national and international experts. This unit should operate under a reliable mechanism with high-level supervision, covering planning, execution, and evaluation, while remaining insulated from political conflicts. It should leverage funding channels, enforce accountability laws, and implement deterrence mechanisms.*
- 3. The study stresses the necessity of involving local communities in setting reconstruction priorities. Ignoring community input is a major cause of urban failure. Mechanisms for interactive communication—through local councils or internal and external dialogue workshops—can help identify actual community needs and foster a sense of ownership and belonging, supporting long-term sustainability.*
- 4. The study recommends capacity building and development of local human capital. Investing in human resources is a core component of reconstruction project efficiency, particularly in strategic planning*

and field execution. True development relies on public awareness rather than purely administrative or security-focused systems, and should prevent undue external interventions.

- 5. The study advises separating conflicts between governmental and local authorities in establishing a framework connecting the Sudanese state, the private sector, NGOs, and international organizations. Clear agreements with defined objectives should ensure cooperation based on a balance between technical and financial support while respecting national sovereignty.*
- 6. Finally, the study recommends re-planning cities using comprehensive, sustainable approaches. This includes focusing on environmental and social dimensions, accounting for population growth, providing services, and ensuring safe urban expansion. Integration between reconstruction efforts, infrastructure development, and long-term development programs is essential.*

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