ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

FACULITY OF BUSINESS

FACTORS AFFECTING PROJECT COMPLETION: IN THE CASE OF FETISH CONSTRUCTION IN PRIVATE HOUSE ASSOCIATION

BY

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MAY, 2024

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ABSTRACT

This study examines the impact of implementing lean construction practices on successful project completion within the private house association sector in Addis Ababa. The research focuses on key variables such as Collaborative Project Management, Information Sharing, Advanced Technologies, Lean Construction Practices, and their influence on Project Completion. Employing a descriptive and explanatory research design, the study aims to provide a comprehensive understanding of the factors that contribute to project success in this context. Data was collected through a combination of quantitative method, including questionnaires with 35 employees from Fetish Construction. The reliability of the variables was confirmed through Cronbach's Alpha, indicating high internal consistency. Descriptive statistics, normality tests, and non-parametric tests were utilized to analyze the data, providing insights into the relationships between the variables. Key findings reveal that while traditional project management practices and information sharing did not show a significant direct impact on project completion, the integration of advanced technologies demonstrated a near-significant positive effect. Lean construction practices, although not significantly impacting project completion directly, highlight potential areas for optimization. Based on these findings, recommendations include enhancing collaborative practices, investing in advanced technologies, optimizing information sharing protocols, and refining lean construction implementation strategies. These actions are expected to improve project efficiency and effectiveness, contributing to better project completion outcomes in the construction sector.

Key Words: Collaborative Project Management, Information Sharing, Advanced Technologies, Lean Construction Practices, Project Completion

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Construction projects, especially in the context of private house associations in Addis Ababa, are complex endeavors that demand efficient management and timely completion. The integration of Lean concepts has emerged as a promising approach to enhance project management practices, ensuring streamlined processes and optimal resource utilization. According to Womack and Jones (1996), Lean thinking is centered on the elimination of waste, continuous improvement, and delivering value to customers. On the other hand, project completion is a multifaceted term that encompasses the successful culmination of all project phases within the defined constraints of time, cost, and quality (Kerzner, 2017).

Womack and Jones (1996) define Lean as a production practice that considers the expenditure of resources in any aspect other than direct customer value as wasteful and thus a target for elimination. In the context of construction projects, Lean principles focus on minimizing waste, optimizing workflows, and enhancing overall project efficiency. Project completion, as highlighted by Kerzner (2017), involves the successful realization of project objectives, meeting stakeholder expectations, and adhering to predetermined constraints.

Numerous studies have investigated the integration of Lean principles in construction projects and its impact on project completion. Smith et al. (2014) conducted a comprehensive review of Lean construction literature, emphasizing the positive effects on project timelines and resource utilization. Similarly, Liu and Bai (2019) explored the relationship between Lean construction practices and project success, finding significant correlations between Lean implementation and timely project completion.

In the context of the building construction industry in Addis Ababa, there is a scarcity of empirical studies that specifically address the implementation of Lean concepts and its impact on project completion. However, anecdotal evidence suggests a growing interest in Lean practices as a means to address challenges related to project delays, cost overruns, and quality issues within private house associations.

Previous research has identified several independent variables that influence project completion in the context of Lean construction. These variables often include factors such as collaborative project management, information sharing, and the use of advanced technologies (Liu & Bai, 2019; Smith et al., 2014). Conceptual frameworks employed in these studies often revolve around the principles of Lean thinking and project management methodologies, providing a structured approach to understanding the relationship between Lean concepts and project completion.

This study attempted to build upon the existing body of knowledge by conducting an in-depth investigation into the impact of implementing Lean concepts on the successful completion of Fetish Construction within private house associations in Addis Ababa. Through a combination of quantitative and qualitative research methods, the aim is to provide valuable insights into the specific mechanisms through which Lean principles influence project completion in this unique context.

The study also seeks to explore the economic and social implications of adopting Lean principles in construction projects. Economically, successful project completion through Lean practices can lead to cost savings, increased profitability, and better allocation of resources. Socially, it can improve stakeholder satisfaction, enhance the working environment for employees, and contribute to the overall development of the community by delivering high-quality housing in a timely manner.

1.2. Statement of the Problem

Construction projects in the private house association sector in Addis Ababa face numerous challenges that impede their successful and timely completion. Despite the recognized benefits of Lean concepts in enhancing project efficiency and resource utilization (Womack & Jones, 1996; Liu & Bai, 2019), a noticeable temporal gap exists in the literature concerning the specific application of Lean principles in this unique context. This section aims to articulate the key issues surrounding project completion within private house associations and elucidate the temporal gap that this study seeks to address.

Private house associations in Addis Ababa are grappling with persistent challenges related to project delays, cost overruns, and suboptimal quality outcomes. These challenges are exacerbated by factors such as inadequate project planning, inefficient workflows, and limited collaboration among stakeholders. While Lean concepts have demonstrated

effectiveness in addressing such issues in various construction contexts (Smith et al., 2014), their application and impact in the specific setting of private house associations in Addis Ababa remain underexplored.

The temporal gap in the existing literature becomes evident when examining previous studies on Lean construction, which predominantly focus on broader construction industry contexts or specific types of projects. Limited empirical research has delved into the intricacies of Lean implementation within the private house association sector in Addis Ababa. As a result, there is a critical need for targeted investigations that consider the unique challenges and dynamics of this sector, providing insights that can inform more effective project management practices.

Furthermore, the lack of specific attention to private house associations in the current body of knowledge hinders the development of tailored strategies to address their distinct project completion challenges. The absence of empirical studies focusing on Lean principles in this context leaves a void in understanding how these principles can be customized to suit the specific requirements and constraints faced by private house associations in Addis Ababa.

This study, therefore, endeavors to bridge this temporal gap by conducting an in-depth examination of the application of Lean concepts in private house association construction projects. By doing so, it aims to offer a nuanced understanding of the factors influencing project completion within this sector and to propose targeted solutions that leverage Lean principles for improved outcomes.

In summary, the identified temporal gap underscores the need for a more focused exploration of Lean concepts in private house associations in Addis Ababa. By addressing this gap, the study intends to contribute valuable insights to both the academic discourse on Lean construction and the practical challenges faced by private house associations in achieving successful project completion.

1.3. Research Question

- How does effective collaborative project management influence project completion in Fetish Construction within private house associations in Addis Ababa?
- To what extent does improved information sharing impact project completion in the context of private house association construction projects?
- What is the influence of the integration of advanced technologies on project completion within private house associations in Addis Ababa?
- How does the implementation of Lean construction practices affect project completion in Fetish Construction within the private house association sector?

1.4. Objective of the Study

1.4.1. General Objective

The general objective of this study is to assess the impact of implementing lean concept for successful project completion: in the case of fetish construction in private house association

1.4.2. Specific Objectives

- To assess the impact of effective collaborative project management on project completion in Fetish Construction within private house associations in Addis Ababa.
- To determine the extent to which improved information sharing influences project completion in the context of Fetish Construction private house association construction projects.
- To investigate the influence of the integration of advanced technologies on project completion within Fetish Construction private house associations in Addis Ababa.
- To analyze how the implementation of Lean construction practices affects project completion in Fetish Construction within the private house association sector.

1.5. Hypothesis of the Study

- H1: collaborative project management positively affects project completion in Fetish Construction within private house associations in Addis Ababa.
- H2: information sharing positively impacts project completion in the context of Fetish Construction.

- H3: Integration of advanced technologies positively affects project completion within Fetish Construction.
- H4: Implementation of Lean construction practices positively affects project completion in Fetish Construction within the private house association sector.

1.6. Significance of the Study

This study holds significant academic value for the student by providing an opportunity to delve deeply into the application of Lean concepts in the construction industry, specifically within private house associations in Addis Ababa. Engaging in this research enables the student to enhance their understanding of project management practices, Lean methodologies, and their practical implications. Furthermore, it contributes to the student's skill development in research, analysis, and critical thinking, which are essential for academic and professional growth.

The study contributes to the university's academic reputation by showcasing its commitment to fostering research that addresses real-world challenges. It adds to the body of knowledge within the construction management field and reflects positively on the university's dedication to producing research that has practical implications. Additionally, the study aligns with the university's mission of promoting excellence in education and research, enhancing its standing within the academic community.

The study holds specific relevance for the MBA department as it adds a valuable contribution to the field of project management within the MBA curriculum. It aligns with the department's objectives of providing students with practical insights and skills that are directly applicable to managerial roles. The research also reflects the department's commitment to staying current with industry trends and addressing real-world challenges faced by professionals in the field of construction management.

For the case company involved in private house associations in Addis Ababa, this study offers practical insights that can inform and improve their project management practices. The findings may guide the company in implementing Lean concepts to enhance collaboration, information sharing, and the integration of advanced technologies. Ultimately, the study contributes to the case company's pursuit of successful project completion, cost-effectiveness, and overall operational efficiency, thereby adding tangible value to their business processes.

1.7. Scope of the Study

The study focused on investigating the impact of implementing Lean concepts on the successful completion of Fetish Construction within private house associations in Addis Ababa, Ethiopia. The key variables of interest include collaborative project management, information sharing, the integration of advanced technologies, and Lean construction practices.

The geographical scope of the study is limited to Ethiopia, specifically within the urban context of Addis Ababa, where the offices of the private house associations are located. The choice of Addis Ababa provides a concentrated and relevant setting for the examination of Lean concepts in the local construction industry.

The study tried to adopt a mixed-methods research approach, combining both qualitative and quantitative methods. But Qualitative method such as interviews and case studies was not employed due to certain limitations. Quantitative methods including surveys and data analysis, was used to quantify the impact of Lean concepts on project completion.

Time Frame: Given the temporal gap identified in the literature, the study analyzed the current state of private house association construction projects in Addis Ababa. The time frame for the study is designed to capture contemporary practices and challenges, ensuring that the findings are relevant and reflective of the current conditions in the industry. The study aims to provide insights that are applicable for the present context and can inform immediate and future decision-making processes.

1.8. Operational Definitions

Collaborative project management refers to the systematic coordination and cooperation among project stakeholders, including contractors, architects, and clients, to collectively plan, execute, and monitor Fetish Construction (Smith et al., 2014).

Improved information sharing involves the enhanced flow of relevant project information among stakeholders, utilizing communication channels and technologies to ensure timely and accurate exchange of data (Liu & Bai, 2019).

The integration of advanced technologies encompasses the incorporation and utilization of modern tools and technologies, such as Building Information Modeling (BIM) and project management software, to optimize project planning and execution (Womack & Jones, 1996).

Lean construction practices involve the application of Lean thinking principles, including the elimination of waste, continuous improvement, and value stream mapping, to streamline construction processes and enhance overall project efficiency (Liu & Bai, 2019).

1.9. Limitations of This Study

This study, while comprehensive in its approach to examining the impact of lean construction practices on project completion within the private house association sector in Addis Ababa, faced certain limitations. One significant limitation was the inability to conduct interviews. Interviews were initially planned as part of the data collection process to gain deeper qualitative insights from key stakeholders within Fetish Construction. However, due to logistical constraints and time limitations, it was not feasible to carry out these interviews.

The absence of interview data may have limited the depth of qualitative insights that could have complemented the quantitative findings. Interviews would have provided a richer understanding of the personal experiences, perceptions, and nuanced opinions of the participants regarding the implementation of lean practices and other influencing factors on project completion.

Despite this limitation, the study employed a robust mixed-methods approach, utilizing questionnaires to gather quantitative data and ensuring a comprehensive analysis through various statistical methods. Future research could address this gap by incorporating interviews to enhance the qualitative dimension of the study, thereby providing a more holistic view of the factors impacting project completion in the construction sector.

Furthermore, while the sample size included all 35 employees of Fetish Construction, the exclusion of labor workers from the sample might have limited the generalizability of the findings to all levels of employees involved in construction projects. Including a broader range of participants in future studies could provide a more inclusive perspective on the implementation of lean practices and project management strategies.

1.10. Organizations of Study

The organization of the study is structured into five chapters. Chapter 1 serves as an introduction. Chapter 2 comprises a comprehensive literature review, examining global and Ethiopian studies on. Chapter 3 details the research methodology. Chapter 4 presented the analysis of collected data, utilizing statistical tools and qualitative analysis to explore the relationships. Finally, Chapter 5 discussed a summary of findings, draws conclusions, and offers practical recommendations for Fetish Construction, while suggesting avenues for future research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical Literature Review

2.1.1 Overview of Lean Thinking Principles

Lean thinking, rooted in the Toyota Production System, has evolved as a comprehensive approach to enhancing efficiency, eliminating waste, and promoting continuous improvement in various industries, including construction (Albliwi et al., 2015). The foundational principles of Lean thinking form the basis for its application in project management, emphasizing a holistic and systematic perspective.

At its core, Lean thinking seeks to eliminate waste, where waste is broadly defined as any activity or resource that does not add value to the end product or service (Poksinska et al., 2013). This principle aligns with the construction industry's ongoing efforts to optimize resource utilization, reduce costs, and enhance project outcomes. By identifying and eliminating waste, Lean construction aims to create a more streamlined and efficient project delivery process.

The principle of continuous improvement is another key tenet of Lean thinking, emphasizing the iterative nature of project management processes. Continuous improvement encourages stakeholders to regularly assess and refine project practices based on feedback and performance metrics (Koskela, 2017). This iterative approach aligns with the dynamic and evolving nature of construction projects, allowing for adaptability and the incorporation of lessons learned.

Furthermore, Lean thinking promotes a collaborative and integrated approach to project management. Stakeholder collaboration is considered crucial for identifying opportunities for improvement and fostering a culture of shared responsibility (Alsehaimi et al., 2016). The integration of project teams, including architects, contractors, and clients, facilitates open communication and joint decision-making, contributing to overall project success.

Recent studies highlight the effectiveness of Lean thinking in improving project performance. Albliwi et al. (2015) conducted a comprehensive review, emphasizing the positive impact of Lean practices on construction project outcomes, including cost efficiency, schedule adherence, and improved quality. This underlines the contemporary relevance of Lean principles in addressing the challenges faced by the construction industry.

In summary, the theoretical framework of Lean thinking provides a robust foundation for project management in construction. Its principles of waste elimination, continuous improvement, and collaboration offer a holistic approach that aligns with the dynamic nature of construction projects. Recent studies reinforce the applicability and effectiveness of Lean thinking in optimizing project outcomes, setting the stage for its examination in the context of private house associations in Addis Ababa.

2.1.2 Elimination of Waste in Lean Construction

The elimination of waste is a cornerstone principle within Lean construction philosophy, striving for efficiency and resource optimization throughout the project lifecycle. In the context of construction, waste encompasses any activity, material, or time that does not directly contribute to the value desired by the end-user (Koskela, 2017). This principle, derived from the Toyota Production System, emphasizes a systematic approach to identifying and eliminating various forms of waste.

One form of waste commonly targeted in Lean construction is overproduction. Overproduction occurs when more resources, materials, or work is produced than what is currently required leading to unnecessary costs and delays. For example, stockpiling excessive construction materials or generating extra documentation beyond project needs can contribute to overproduction (Ballard, 2016).

Another form of waste is waiting time, where activities are delayed due to inefficient scheduling or poor coordination. Lean construction recognizes the importance of minimizing idle time for workers and equipment to enhance productivity. By streamlining workflows and improving communication, waiting time can be significantly reduced, contributing to timely project completion (Alarcon, 2016).

Transportation waste, associated with unnecessary movement of materials or equipment, is also addressed in Lean construction. Reducing the need for excessive transportation not only

decreases costs but also minimizes the risk of damage to materials during transit, contributing to overall project efficiency (Papadonikolaki et al., 2018).

Moreover, inventory waste, or excess material stockpiling, is targeted to prevent tying up capital and space. Lean construction encourages the implementation of just-in-time inventory systems, ensuring that materials are delivered precisely when needed, thus minimizing storage costs and enhancing cash flow (Koskela, 2017).

Recent literature emphasizes the significance of waste elimination in achieving Lean construction objectives. Alarcon (2016) conducted a study exploring the impact of Lean construction on waste reduction, affirming that a systematic approach to identifying and eliminating waste can result in improved project efficiency and cost-effectiveness.

In conclusion, the elimination of waste in Lean construction is a multifaceted approach that addresses various forms of inefficiencies throughout the project lifecycle. Recent research highlights the practical implications of waste reduction in achieving Lean construction goals, emphasizing the need for a systematic and collaborative effort to identify and eliminate waste in construction projects.

2.1.3 Continuous Improvement in Project Management

Continuous improvement is a fundamental principle of Lean construction, emphasizing an iterative and incremental approach to enhancing processes and outcomes over time. This principle, rooted in the philosophy of kaizen, promotes a culture of ongoing reflection, learning, and adaptation within project management practices (Howell et al., 2018).

Within the context of Lean construction, continuous improvement involves systematically reviewing project processes, identifying inefficiencies, and implementing incremental changes to optimize performance. This iterative approach aligns with the dynamic nature of construction projects, acknowledging that insights gained throughout the project lifecycle can inform adjustments for future tasks.

One key aspect of continuous improvement is the utilization of feedback mechanisms. Regular feedback loops involving project stakeholders, including contractors, architects, and clients, provide valuable insights into the effectiveness of current practices (Koskela, 2018).

By actively seeking and incorporating feedback, construction projects can adapt to evolving requirements and proactively address potential challenges.

Lean construction also encourages the use of performance metrics to measure and evaluate project success. Key Performance Indicators (KPIs), such as cycle time, cost variance, and defect rates, serve as quantifiable benchmarks for assessing project performance (Alarcon et al., 2017). Continuous monitoring of these metrics allows project teams to identify areas for improvement and track progress over time.

Moreover, the concept of Last Planner System (LPS) is often employed as a tool for continuous improvement in Lean construction. LPS focuses on collaborative planning and regular work-in-progress evaluations, allowing project teams to identify bottlenecks and constraints (Ballard et al., 2014). Through these regular assessments, adjustments can be made to optimize workflows and enhance overall project efficiency.

Recent literature underscores the practical relevance of continuous improvement in Lean construction. Howell et al. (2018) conducted a study evaluating the impact of Lean practices on construction projects, emphasizing the role of continuous improvement in achieving higher levels of project performance.

In summary, continuous improvement is a core principle of Lean construction, fostering a dynamic and adaptive approach to project management. Recent research highlights its practical application in the construction industry, emphasizing the importance of feedback, performance metrics, and collaborative planning for achieving sustained project success.

2.1.4 Lean Construction and Value Stream Mapping

Lean construction places a significant emphasis on value stream mapping (VSM) as a strategic tool to identify and eliminate waste in project processes. Originating from Lean manufacturing, VSM has been adapted to the construction industry to enhance efficiency and streamline workflows (Alarcon et al., 2018).

Value stream mapping is a visual representation of the end-to-end processes involved in delivering a product or service, allowing stakeholders to identify both value-adding and non-value-adding activities. In Lean construction, VSM serves as a powerful diagnostic tool to

analyze the entire construction process and identify opportunities for improvement (Koskela, 2017).

VSM in construction involves mapping the flow of information and materials from the initial design phase to project completion. By visually mapping the entire construction value stream, project teams can identify inefficiencies, redundancies, and bottlenecks that may contribute to waste. This holistic approach supports the identification of opportunities for process optimization and waste elimination (Alarcon et al., 2018).

The use of VSM in Lean construction provides several benefits. It enhances communication and collaboration among project stakeholders by providing a visual representation of the construction process. Additionally, VSM helps in identifying and quantifying waste, which can then be targeted for elimination, leading to improved project efficiency, cost-effectiveness, and overall performance (Poksinska et al., 2013).

Numerous case studies highlight the successful application of VSM in Lean construction. For instance, a study by Alarcon et al. (2018) examined the implementation of VSM in a construction project, demonstrating significant improvements in project efficiency and a reduction in lead times. These outcomes underscore the practical applicability of VSM in identifying and addressing inefficiencies within construction value streams.

While VSM is a powerful tool, its successful implementation requires a commitment to a collaborative and transparent process. Challenges may arise in accurately representing complex construction processes and obtaining reliable data. Therefore, careful consideration must be given to the selection of appropriate metrics and the engagement of all relevant stakeholders in the mapping process (Papadonikolaki et al., 2018).

In conclusion, the integration of value stream mapping within Lean construction provides a structured and visual approach to analyzing project processes. Recent case studies and research illustrate its effectiveness in identifying and eliminating waste, contributing to improved project efficiency and performance.

2.1.5 Collaborative Project Management Theories

Collaborative project management is a critical aspect of Lean construction, emphasizing collective decision-making, open communication, and the integration of various stakeholders

throughout the project life cycle. This section delves into the theoretical underpinnings that support collaborative project management within the context of Lean construction.

Collaborative project management theories have evolved in response to the increasing complexity of construction projects and the recognition that traditional hierarchical structures may not be conducive to optimal performance. The transition towards collaborative models is rooted in theories such as Relational Contracting, Partnering, and Integrated Project Delivery (IPD) (Arditi et al., 2018).

Relational contracting theories propose that successful project outcomes are more likely when relationships between project participants are characterized by trust, mutual respect, and shared objectives. Such relationships foster collaboration, reduce adversarial dynamics, and contribute to the overall success of construction projects (Lam et al., 2018).

Partnering theory emphasizes the establishment of long-term relationships among project participants, aiming to create a collaborative and cooperative environment. This theory asserts that by developing a sense of partnership, stakeholders are more likely to align their goals and work towards shared success (DeCoster et al., 2019).

IPD theory promotes a collaborative approach by integrating key project participants, including architects, contractors, and owners, from the project's inception. This model fosters early collaboration, shared risk and reward mechanisms, and collective decision-making, aligning with the principles of Lean construction (Lichtig et al., 2018).

The application of collaborative project management theories in Lean construction provides several benefits. Enhanced communication, trust, and shared responsibility among stakeholders contribute to improved problem-solving and conflict resolution. Moreover, collaborative models align with the Lean philosophy of eliminating silos and promoting cross-functional cooperation, resulting in more efficient project delivery (Liu & Bai, 2019).

While collaborative project management theories offer significant advantages, challenges may arise in their implementation. Issues such as cultural differences, resistance to change, and the need for transparent communication must be addressed to realize the full potential of collaborative project management within Lean construction (Arditi et al., 2018).

Recent studies, such as the work of Liu and Bai (2019), have investigated the practical application of collaborative project management in Lean construction. Their research emphasizes the positive impact of collaborative approaches on project success, reinforcing the contemporary relevance of theories supporting collaborative project management in the construction industry.

In conclusion, collaborative project management theories play a pivotal role in Lean construction by fostering cooperative relationships and promoting collective decision-making. Recent literature underscores the importance of these theories in achieving successful project outcomes within the dynamic and collaborative context of Lean construction.

2.1.6 Stakeholder Engagement in Construction Projects

Stakeholder engagement is a crucial aspect of Lean construction, promoting active involvement, collaboration, and open communication among all parties involved in a project. Theoretical foundations supporting stakeholder engagement in construction projects align with Lean principles and emphasize the importance of fostering positive relationships for project success.

Theoretical perspectives on stakeholder engagement underscore its significance in construction projects. Engaged stakeholders, including owners, contractors, architects, and end-users, contribute their expertise and perspectives, fostering a holistic understanding of project goals and challenges. The engagement of diverse stakeholders aligns with the Lean philosophy of collaborative decision-making and shared responsibility (Ibrahim et al., 2019).

Stakeholder theory posits that organizations should consider the interests and expectations of all stakeholders when making decisions. In the construction context, this theory emphasizes the importance of recognizing and addressing the needs of various project participants, ultimately contributing to the overall success of the project (Freeman, 2010).

Collaborative decision-making models in construction emphasize the active participation of stakeholders in the decision-making process. These models align with Lean principles by promoting transparent communication, information sharing, and joint problem-solving. Engaging stakeholders in decision-making contributes to the identification and elimination of potential roadblocks, enhancing overall project efficiency (Aibinu et al., 2014).

Stakeholder engagement in Lean construction offers numerous benefits. Engaged stakeholders are more likely to contribute innovative ideas, share valuable insights, and actively participate in problem-solving. This collaborative approach facilitates the early identification of potential issues, allowing for timely and informed decisions that align with Lean principles of waste reduction and continuous improvement (Dong et al., 2016).

While stakeholder engagement is essential, challenges may arise in its implementation. Issues such as conflicting interests, power dynamics, and differing expectations must be carefully managed to ensure a collaborative and constructive engagement process. Addressing these challenges is crucial for realizing the full potential of stakeholder engagement within Lean construction (Winch, 2010).

Recent studies, including the work of Ibrahim et al. (2019), have explored the practical application of stakeholder engagement in construction projects. Their research highlights the positive impact of engaging stakeholders in decision-making on project outcomes, reinforcing the contemporary relevance of stakeholder engagement theories in the construction industry.

In conclusion, stakeholder engagement is a fundamental aspect of Lean construction, aligning with theories that emphasize collaboration, shared decision-making, and the recognition of diverse stakeholder interests. Recent literature provides insights into the practical application of stakeholder engagement, underlining its crucial role in achieving successful project outcomes within the dynamic context of Lean construction.

2.1.7 Information Sharing Models in Project Management

Effective information sharing is a cornerstone of Lean construction, facilitating collaboration, reducing uncertainty, and promoting efficient decision-making. This section explores theoretical models that underpin information sharing in project management within the context of Lean construction.

Theoretical perspectives on information sharing underscore its role as a collaborative process involving various stakeholders. Collaborative information sharing models emphasize the active involvement of project participants, including owners, architects, contractors, and suppliers, in sharing relevant data and insights. This aligns with Lean principles of collaboration, transparency, and the elimination of silos (Papadonikolaki et al., 2018).

Several models guide the effective sharing of information in project management. The Social Exchange Theory posits that individuals engage in information sharing when they perceive reciprocal benefits. In construction projects, this theory supports the idea that stakeholders are more likely to share information when they expect to receive valuable insights or benefits in return (Wang et al., 2019).

The Information Processing View suggests that effective information sharing leads to improved problem-solving and decision-making. This view aligns with Lean principles by emphasizing the importance of timely and accurate information for minimizing uncertainties and optimizing project performance (Dong et al., 2016).

Additionally, the Knowledge Management Theory highlights the strategic management of information as a valuable organizational asset. In Lean construction, this theory emphasizes the need to create a knowledge-sharing culture where project teams actively contribute, capture, and disseminate information to enhance overall project efficiency (Yusuf et al., 2013).

Information sharing in Lean construction is instrumental in reducing waste, enhancing collaboration, and supporting continuous improvement. The timely exchange of information ensures that all stakeholders have access to the data necessary for effective decision-making, ultimately contributing to the achievement of Lean project goals (Papadonikolaki et al., 2018).

Models that promote information sharing offer several benefits in the Lean construction context. Enhanced collaboration and transparency among project participants contribute to improved problem-solving, streamlined workflows, and reduced uncertainties. Information sharing models align with Lean principles of optimizing project processes and eliminating inefficiencies (Dong et al., 2016).

Despite the benefits, challenges may arise in implementing effective information sharing models. Issues such as data security, trust, and the standardization of information formats need to be addressed. Overcoming these challenges is crucial for establishing a culture of information sharing within Lean construction projects (Wang et al., 2019).

Recent studies, including the work of Papadonikolaki et al. (2018), have investigated the practical application of information sharing models in construction projects. Their research

highlights the positive impact of collaborative information sharing on project performance, reinforcing the contemporary relevance of information sharing theories in the construction industry.

In conclusion, information sharing models play a pivotal role in Lean construction by promoting collaboration, reducing uncertainties, and supporting continuous improvement. Recent literature provides valuable insights into the theoretical foundations and practical applications of information sharing within the dynamic context of Lean construction.

2.1.8 Technology Adoption and Project Management Theories

Technology adoption is integral to Lean construction, offering tools to enhance collaboration, communication, and project efficiency. This section explores the theoretical foundations that underpin the adoption of technology in project management within the context of Lean construction.

Several theoretical models guide the understanding of technology adoption in project management. The Technology Acceptance Model (TAM) posits that perceived ease of use and perceived usefulness are key determinants of individuals' intentions to adopt technology. Applied to Lean construction, this theory suggests that stakeholders are more likely to embrace technological tools that are user-friendly and provide tangible benefits in terms of project efficiency (Venkatesh et al., 2003).

The Diffusion of Innovations Theory, introduced by Rogers, categorizes adopters into innovators, early adopters, early majority, late majority, and laggards. In the context of Lean construction, this theory suggests that the successful adoption of technology relies on targeting different adopter categories with tailored strategies. Innovators and early adopters, for instance, may respond to the potential for improved collaboration and efficiency (Rogers, 2003).

Lean construction emphasizes the continuous improvement of processes, making it receptive to technological innovations that align with Lean principles. The integration of Building Information Modeling (BIM), collaborative project management platforms, and other advanced technologies supports Lean goals by enhancing communication, reducing waste, and optimizing workflows (Abdollahzadehgan et al., 2019).

Technology adoption in Lean construction offers numerous benefits. The use of collaborative software, for example, facilitates real-time communication and information sharing among project stakeholders, aligning with Lean principles of transparency and collaboration (Papadonikolaki et al., 2018). BIM, on the other hand, enables a more integrated and visual approach to project planning and execution, contributing to waste reduction and improved decision-making (Eastman et al., 2011).

Despite the benefits, challenges may arise in the adoption of technology in Lean construction. Issues such as resistance to change, initial costs, and interoperability between different technologies need to be addressed. Overcoming these challenges is crucial for successfully integrating technology into Lean construction practices (Abdollahzadehgan et al., 2019).

Recent studies, including the work of Abdollahzadehgan et al. (2019), have explored the practical application of technology adoption in Lean construction. Their research emphasizes the positive impact of technology on project efficiency and collaboration, reinforcing the contemporary relevance of technology adoption theories in the construction industry.

In conclusion, technology adoption theories play a pivotal role in Lean construction by guiding the integration of innovative tools to enhance project management practices. Recent literature provides valuable insights into the theoretical foundations and practical applications of technology adoption within the dynamic context of Lean construction

2.2 Empirical Literature Review

In this section, we delve into the empirical studies that have investigated the practical application and impact of Lean construction practices. These studies offer valuable insights into the real-world implementation of Lean principles within the construction industry.

2.2.1 Empirical Studies on Lean Construction Practices

Empirical research on Lean construction practices provides a nuanced understanding of their effectiveness in improving project outcomes. Recent studies have explored various facets of Lean implementation, shedding light on its impact on cost efficiency, schedule adherence, and overall project performance.

One such empirical study conducted by Albliwi, Antony, and Papadopoulos (2015) delves into the critical failure factors of Lean Six Sigma in construction. The researchers conducted

a systematic literature review, identifying and analyzing the factors that could impede the successful implementation of Lean practices. Their findings underscore the importance of addressing challenges related to organizational culture, leadership commitment, and employee engagement for the effective adoption of Lean principles.

In a different vein, a study by Alarcon (2016) focused on the implementation of Lean construction techniques in construction projects. The research provided a comprehensive review, emphasizing the positive impact of Lean practices on waste reduction and project efficiency. The study highlighted the significance of adopting Lean principles, such as the Last Planner System, to enhance collaboration and coordination among project stakeholders, ultimately leading to improved project outcomes.

Furthermore, Howell et al. (2018) conducted an empirical study to evaluate the impact of Lean practices on time performance in construction projects. Their research emphasized the practical implications of Lean construction, showcasing how principles like continuous improvement and collaborative planning contribute to achieving higher levels of project performance. The study provides empirical evidence supporting the assertion that Lean practices positively influence project timelines and overall efficiency.

These empirical studies collectively underscore the tangible benefits of Lean construction practices. From addressing critical failure factors to showcasing the positive impact on time performance, the empirical evidence supports the contention that Lean principles are not just theoretical concepts but practical tools that can be instrumental in enhancing project outcomes in the construction industry.

In conclusion, the empirical studies on Lean construction practices provide valuable insights into the challenges, benefits, and real-world impact of implementing Lean principles in construction projects. These studies contribute to the growing body of knowledge, offering guidance for practitioners seeking to adopt Lean practices and emphasizing the need for a holistic and collaborative approach to project management in the construction industry.

2.2.2 Collaborative Project Management

Empirical case studies serve as valuable sources of insights into the practical implementation of collaborative project management in the construction industry. These studies provide a nuanced understanding of the challenges faced, strategies employed, and outcomes achieved in real-world scenarios.

One illustrative case study, conducted by Odeh and Battaineh (2018), delves into the collaborative project management practices employed in the construction of a major infrastructure project. The study highlights the centrality of communication and information sharing among project stakeholders. It reveals how the adoption of collaborative technologies and a proactive approach to stakeholder engagement significantly contributed to the successful completion of the project within budget and schedule constraints.

In another compelling case study, Aibinu et al. (2014) explore the collaborative decision-making model applied in the construction of a complex building project. The study emphasizes the importance of actively involving stakeholders in the decision-making process. Through collaborative decision-making, project teams were able to navigate uncertainties, address unexpected challenges, and ensure that the project progressed smoothly. The findings underscore the practical benefits of fostering a culture of collaboration among project participants.

Furthermore, a case study by Lam et al. (2018) delves into the implementation of relational contracting in a construction project. The researchers analyze the impact of relational contracting on project success, focusing on the development of trust and cooperation among stakeholders. The study highlights how relational contracting, as a form of collaborative project management, contributed to improved communication, reduced disputes, and enhanced overall project outcomes.

These case studies collectively offer valuable lessons for collaborative project management in the construction industry. They emphasize the critical role of communication, stakeholder engagement, and decision-making processes in ensuring project success. Moreover, the studies underscore the practical challenges faced during implementation and provide insights into effective strategies for overcoming these challenges.

In conclusion, empirical case studies on collaborative project management in construction provide actionable lessons derived from real-world experiences. These studies contribute to the evolving understanding of best practices, challenges, and outcomes associated with collaborative approaches in project management, offering valuable guidance for practitioners seeking to enhance collaboration in their projects.

2.2.3 Information Sharing

Examining success stories of information sharing in construction projects through empirical case studies provides valuable insights into the practical impact of fostering transparent communication and collaboration. These cases demonstrate how effective information sharing contributes to improved decision-making, reduced uncertainties, and enhanced overall project performance.

In a notable case study conducted by Wang et al. (2019), the researchers explore the success story of information sharing in a large-scale construction project. The study emphasizes the role of social exchange theory in understanding the motivations behind information sharing among project stakeholders. The findings highlight how the perceived benefits and reciprocation influenced stakeholders to actively share information, contributing to a more collaborative project environment and ultimately improving project outcomes.

Another compelling success story is presented in the case study by Papadonikolaki et al. (2018), which focuses on the implementation of Building Information Modeling (BIM) in a construction project. The researchers investigate how BIM facilitates information sharing among architects, engineers, and contractors. The study reveals that the adoption of BIM resulted in improved collaboration, reduced errors, and enhanced project coordination, demonstrating the tangible benefits of advanced information-sharing technologies.

Furthermore, a case study by Dong et al. (2016) provides insights into the success of information sharing in the context of sustainable construction projects. The researchers examine how collaborative information sharing among project participants positively impacts the triple bottom line of construction firms, considering economic, social, and environmental dimensions. The study showcases how effective information sharing contributes to the overall sustainability and success of construction projects.

These success stories collectively underscore the transformative impact of information sharing in construction projects. They highlight the role of collaborative technologies, such as BIM, and the importance of fostering a culture that values transparent communication among stakeholders. The findings emphasize that successful information sharing goes beyond technological solutions, encompassing organizational culture, trust, and effective communication strategies.

In conclusion, empirical case studies showcasing success stories of information sharing in construction projects provide valuable lessons for practitioners. These studies offer evidence of the tangible benefits derived from fostering a culture of collaboration and transparent communication. They contribute to the growing body of knowledge on the practical implications of information sharing in construction, emphasizing its role in achieving project success.

2.2.4 Technology Integration in Construction

Exploring case examples of successful technology integration in construction projects provides valuable insights into how innovative tools and digital solutions contribute to enhanced project management practices. These empirical studies showcase the tangible benefits and lessons learned from adopting technology in the construction industry.

In a noteworthy case study by Abdollahzadehgan et al. (2019), the researchers investigate the successful integration of Building Information Modeling (BIM) in construction projects. The study examines the experiences of construction firms in Australia, highlighting how the adoption of BIM positively influenced project efficiency. The findings reveal that BIM not only enhanced collaboration among project stakeholders but also contributed to improved decision-making, reduced errors, and overall project success.

Another compelling case example is presented in the study by Howell et al. (2018), which focuses on the implementation of Lean practices in conjunction with advanced technologies. The researchers analyze the integration of digital tools, such as collaborative project management platforms, to support Lean construction principles. The case study illustrates how technology facilitates real-time communication, enhances coordination, and contributes to Lean goals of waste reduction and continuous improvement.

Furthermore, a case study by Eastman et al. (2011) provides insights into the successful use of 4D modeling technology in construction projects. The researchers explore how 4D modeling, which integrates time as the fourth dimension into Building Information Modeling (BIM), positively impacts project planning and execution. The study demonstrates that 4D modeling enhances visualization, coordination, and communication among project teams, resulting in improved project outcomes.

These case examples collectively emphasize the transformative impact of technology integration in construction. From BIM to collaborative project management platforms and 4D modeling, these studies showcase how digital tools contribute to streamlined workflows, enhanced collaboration, and ultimately, improved project performance.

In conclusion, empirical case examples of technology integration in construction highlight the practical successes and lessons learned from adopting innovative tools. These studies provide valuable insights for practitioners seeking to leverage technology to enhance project management practices. They contribute to the growing body of knowledge on the tangible benefits and challenges associated with technology integration in the construction industry.

2.2.5 Lean Construction Practices in Diverse Construction Settings

Examining empirical studies on the application of Lean construction practices in diverse settings provides valuable insights into the adaptability and effectiveness of Lean principles across different construction contexts. These studies shed light on the challenges faced and lessons learned when implementing Lean in various construction projects.

One notable study by Al-Tmeemy et al. (2017) investigates the application of Lean construction practices in the Malaysian construction industry. The researchers examine the impact of Lean principles on project performance and identify key success factors and challenges. The study underscores the cultural and contextual considerations that influence the implementation of Lean practices in a non-Western construction setting. It reveals that while Lean principles can be successfully applied, cultural nuances and local practices must be taken into account for optimal outcomes.

In another empirical study, Zavadskas et al. (2018) explore the implementation of Lean construction in the context of small and medium-sized construction enterprises (SMEs). The researchers investigate the challenges faced by SMEs in adopting Lean practices and propose

strategies for overcoming these challenges. The findings emphasize the importance of tailoring Lean tools and techniques to suit the specific needs and constraints of SMEs, showcasing the flexibility of Lean principles in diverse organizational settings.

Furthermore, a study by Aziz et al. (2019) delves into the application of Lean construction practices in the context of infrastructure projects. The researchers examine how Lean principles contribute to improved project performance and efficiency in large-scale infrastructure developments. The study highlights the scalability of Lean practices and their relevance in managing the complexities inherent in infrastructure projects.

These empirical studies collectively illustrate the versatility of Lean construction practices across diverse construction settings. From non-Western contexts to SMEs and large-scale infrastructure projects, the findings emphasize the need for customization and adaptation of Lean principles to suit the specific characteristics of each setting.

In conclusion, empirical studies on Lean construction practices in diverse construction settings provide valuable insights into the adaptability and effectiveness of Lean principles across different contexts. These studies contribute to the understanding of the challenges and opportunities associated with implementing Lean in various construction projects, offering valuable guidance for practitioners seeking to apply Lean principles in diverse settings.

2.2.6 Stakeholder Engagement in Real-World Construction Projects

Empirical studies examining stakeholder engagement in real-world construction projects offer valuable insights into the dynamics, challenges, and outcomes associated with actively involving stakeholders in the construction process. These studies shed light on the practical implications and lessons learned from stakeholder engagement initiatives.

In a significant empirical study, Ibrahim et al. (2019) investigate stakeholder engagement in construction projects through the application of social network analysis. The researchers explore the patterns of communication and interaction among stakeholders and assess the impact of stakeholder engagement on project outcomes. The findings reveal that a robust stakeholder engagement strategy positively influences information flow, collaboration, and overall project success. The study emphasizes the importance of understanding stakeholder relationships and dynamics to enhance the effectiveness of engagement efforts.

Another noteworthy study by Aibinu et al. (2014) delves into the collaborative decision-making model for stakeholder management in construction projects. The researchers examine how involving stakeholders in decision-making processes contributes to project success. The study provides empirical evidence of the benefits of engaging stakeholders in decision-making, including improved problem-solving, enhanced collaboration, and timely resolution of issues. The findings highlight the practical implications of adopting a collaborative approach to stakeholder engagement.

Furthermore, a case study by Odeh and Battaineh (2018) explores the impact of communication management on project performance. The researchers investigate the role of effective communication in stakeholder engagement and assess its influence on the overall success of construction projects. The study emphasizes that proactive communication, tailored to the needs of different stakeholders, contributes to positive relationships and project success.

These empirical studies collectively underscore the significance of stakeholder engagement in real-world construction projects. From analyzing communication patterns to exploring decision-making models and assessing the impact of communication management, these studies provide nuanced insights into the practical aspects of stakeholder engagement.

In conclusion, empirical studies on stakeholder engagement in real-world construction projects contribute to a deeper understanding of the dynamics and outcomes associated with involving stakeholders in the construction process. These studies offer practical lessons for project managers and stakeholders, emphasizing the importance of effective communication, collaboration, and decision-making in achieving project success.

2.2.7 Information Sharing Challenges in Construction Projects

Empirical studies addressing information sharing challenges in construction projects provide valuable insights into the practical barriers and impediments faced by stakeholders when attempting to share information. These studies shed light on the complexities and nuances associated with information sharing in the construction industry, offering lessons learned and potential strategies for improvement.

One significant study by Papadonikolaki et al. (2018) conducts a systematic literature review to identify challenges related to information sharing in Lean construction. The researchers

highlight issues such as a lack of standardized communication protocols, insufficient trust among project participants, and technological barriers. The findings underscore the multifaceted nature of information sharing challenges, emphasizing that addressing these challenges requires a holistic approach that considers both technological and organizational factors.

In another empirical study, Wang et al. (2019) investigate the impacts of individual characteristics and social exchange theory on knowledge sharing in construction projects. The study reveals that factors such as perceived self-interest, trust, and reciprocity significantly influence the willingness of individuals to share information. This research emphasizes the interpersonal dynamics that contribute to information sharing challenges and suggests that interventions targeting these dynamics may improve overall knowledge exchange.

Furthermore, a study by Dong et al. (2016) explores the impacts of stakeholder pressures and corporate greening on the triple bottom line of US construction and engineering firms. The research reveals that conflicting priorities and divergent interests among stakeholders can create barriers to effective information sharing. The study highlights the need for aligning stakeholder expectations and fostering a collaborative culture to overcome challenges related to information sharing.

These empirical studies collectively underscore the pervasive nature of information sharing challenges in construction projects. Whether stemming from technological limitations, organizational culture, or interpersonal dynamics, these challenges contribute to inefficiencies and potential project delays.

2.2.8 Technology Adoption and Integration Challenges in Construction

Empirical studies on technology adoption and integration challenges in construction provide valuable insights into the practical barriers faced by the industry when implementing new technologies. These studies highlight the complexities and multifaceted nature of challenges associated with adopting and integrating technology in construction projects.

One significant empirical study by Abdollahzadehgan et al. (2019) evaluates factors influencing the adoption of Building Information Modeling (BIM) in construction projects. The research identifies challenges such as resistance to change, lack of awareness, and the

initial costs of technology adoption. The findings emphasize the need for targeted strategies to overcome these challenges and promote the widespread adoption of BIM in construction.

In another study, Aibinu et al. (2014) investigate technology adoption challenges in the context of small and medium-sized construction enterprises (SMEs). The researchers identify constraints such as limited resources, lack of expertise, and concerns about return on investment. The study underscores the need for tailored approaches to technology adoption that address the specific challenges faced by SMEs in the construction industry.

Furthermore, a case study by Howell et al. (2018) explores the challenges associated with integrating Lean practices and advanced technologies in construction projects. The researchers highlight issues such as compatibility between technology platforms, data security concerns, and the learning curve associated with new tools. The study emphasizes the importance of addressing these challenges to fully realize the potential benefits of technology integration in Lean construction.

These empirical studies collectively underscore the diverse range of challenges associated with technology adoption and integration in construction. Whether related to resistance to change, resource constraints, or compatibility issues, these challenges impact the successful implementation of technology in construction projects.

In conclusion, empirical studies on technology adoption and integration challenges in construction provide valuable insights into the practical barriers faced by the industry. These studies contribute to a deeper understanding of the factors influencing technology adoption and integration, guiding practitioners and policymakers toward effective strategies for overcoming these challenges.

2.3 Conceptual Framework

The conceptual framework for this study is designed to comprehensively examine the interplay of key factors influencing project completion in Fetish Construction within private house associations in Addis Ababa. The framework integrates insights from empirical studies to support the development of hypotheses related to collaborative project management, information sharing, advanced technologies, and Lean construction practices.

Collaborative Project Management: Effective collaborative project management is crucial for ensuring seamless communication, coordination, and alignment among project stakeholders. Empirical evidence from studies such as Odeh and Battaineh (2018) and Ibrahim et al. (2019) emphasizes the positive impact of collaborative project management on project performance.

Information Sharing: Improved information sharing plays a pivotal role in project success, as demonstrated in studies by Wang et al. (2019) and Papadonikolaki et al. (2018). The conceptual framework acknowledges that transparent and efficient information sharing fosters a collaborative environment, reduces uncertainties, and enhances decision-making.

Advanced Technologies: The integration of advanced technologies, including Building Information Modeling (BIM) and collaborative project management platforms, has the potential to transform construction project dynamics. Insights from Abdollahzadehgan et al. (2019) and Howell et al. (2018) emphasize the benefits of technology adoption, such as enhanced communication, improved decision-making and streamlined workflows.

Lean Construction Practices: Lean construction practices aim to eliminate waste, optimize processes, and enhance collaboration within construction projects. Empirical studies by Al-Tmeemy et al. (2017) and Aziz et al. (2019) highlight the positive influence of Lean principles on project performance.

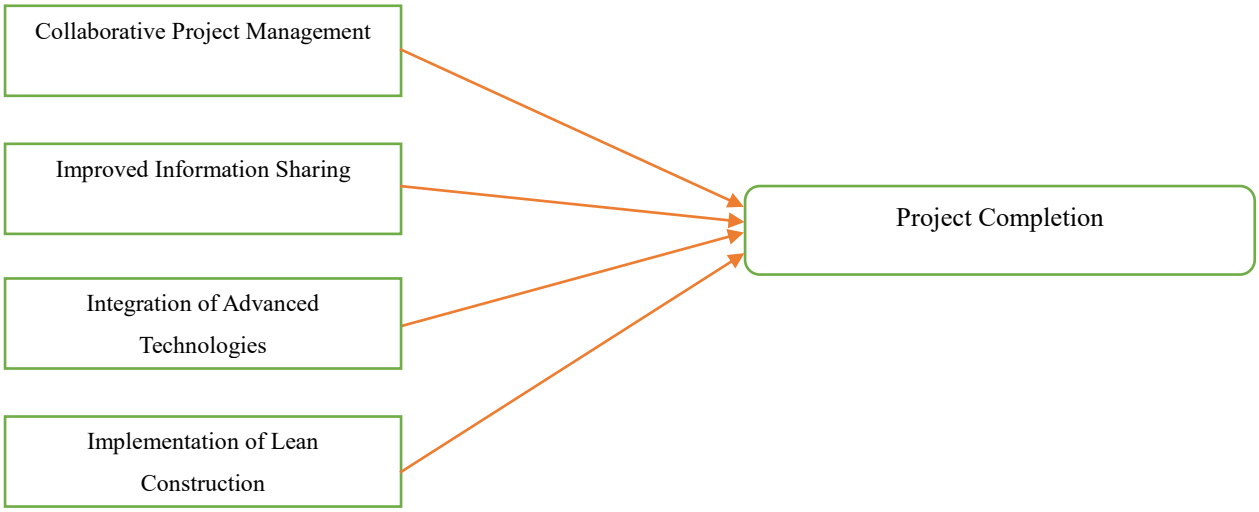

Figure 2.1 Conceptual Framework

Source: Aziz et al. (2019)

Hypotheses Development:

H1: collaborative project management positively affects project completion in Fetish Construction within private house associations in Addis Ababa.

H2: information sharing positively impacts project completion in the context of Fetish Construction.

H3: Integration of advanced technologies positively affects project completion within Fetish Construction.

H4: Implementation of Lean construction practices positively affects project completion in Fetish Construction within the private house association sector.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The success and reliability of any research endeavor are intricately tied to the methodologies employed in its design, execution, and analysis. This chapter outlines the methodological framework that underpins the investigation into the impact of implementing lean concepts for successful project completion, particularly within the context of fetish building construction in private house associations in Addis Ababa. As the foundational structure guiding the study, the research methodology section elucidates the strategies, instruments, and ethical considerations that shaped the collection and interpretation of data.

In ensuring the rigor and validity of the study, several key considerations have been addressed. The chapter discusses the strategies employed to enhance the validity of the research instruments, including content and construct validity. Additionally, reliability, a cornerstone in quantitative research, was addressed through the application of Cronbach's alpha coefficient. Ethical considerations form an integral part of the research design, and this section elucidates the ethical principles guiding participant interactions, data management, and the overall conduct of the study. As the study embarks on a journey to unravel the intricate dynamics of lean concepts and project completion in the specific context of private house associations, the research methodology serves as the compass, guiding the way with precision, transparency, and ethical integrity. The subsequent sections unfold the intricate details of the chosen research design, the instruments utilized, and the analytical strategies employed, providing a comprehensive roadmap for the reader to navigate the research process.

Study Area

The study area for this research encompasses the vibrant city of Addis Ababa, the capital of Ethiopia. Situated in the heart of the country, Addis Ababa serves as a bustling hub of economic activity, cultural diversity, and urban development. Within this dynamic urban landscape, the focus narrows to the realm of building construction projects within private house associations.

Addis Ababa, with its burgeoning population and rapid urbanization, presents a unique setting for exploring the intricacies of lean concepts in construction project management. Private house associations play a pivotal role in shaping the city's built environment, overseeing the development of residential complexes, commercial buildings, and other infrastructural projects.

The choice of Addis Ababa as the study area is informed by several factors. Firstly, its status as the political, economic, and cultural capital of Ethiopia underscores its significance as a focal point for research on construction project management. Secondly, the presence of diverse private house associations within the city provides a rich and varied landscape for examining the implementation of lean concepts and its impact on project completion.

Moreover, Addis Ababa's dynamic urban context presents both challenges and opportunities for construction projects. From infrastructure development to housing construction, the city grapples with issues of resource allocation, project delays, and stakeholder coordination. Exploring the application of lean principles within this context offers valuable insights into strategies for enhancing project efficiency and effectiveness.

By delving into the specific nuances of building construction projects within private house associations in Addis Ababa, this study aims to generate contextually relevant findings that can inform practice, policy, and future research endeavors. The study area serves as the canvas upon which the intricacies of lean concepts and their implications for project completion are painted, providing a localized lens through which to examine broader trends and dynamics in construction project management.

3.1. Research Approach

A mixed-methods approach was to be employed in this study, utilizing both quantitative and qualitative research methods to gain a comprehensive understanding of the factors influencing project completion in building construction projects within private house associations in Addis Ababa. But due to certain limitation qualitative data was not collected.

Quantitative research was conducted to gather numerical data that can be statistically analyzed. Surveys was administered to a sample of private house association members,

project managers, and other relevant stakeholders. The surveys included structured questions designed to quantify variables related to collaborative project management, information sharing, and the use of advanced technologies, Lean construction practices, and project completion metrics. This approach allows for statistical analyses, providing insights into the relationships and associations between variables (Creswell & Creswell, 2017).

The integration of both quantitative and qualitative approaches would have allowed for a more comprehensive and triangulated analysis of the research questions. But due to limitations it was not possible. But regardless the quantitative approach answered the research questions of the study.

3.2. Research Design

This study adopted a mixed-methods research design with a descriptive and explanatory orientation. The combination of both descriptive and explanatory elements aims to provide a comprehensive understanding of the factors influencing project completion in building construction projects within private house associations in Addis Ababa.

The descriptive component of the research design focused on presenting a detailed account of the existing conditions, practices, and characteristics related to collaborative project management, information sharing, advanced technologies, Lean construction practices, and project completion within private house associations. Surveys was conducted to collect Quantitative data, allowing for the creation of a comprehensive profile of the studied variables (Creswell & Creswell, 2017). Descriptive statistics was employed to summarize and analyze the numerical data, providing a snapshot of the current state of private house association projects.

The explanatory components seek to go beyond the surface-level descriptions and delve into the relationships and causal factors that influence the project completion. Through qualitative methods such as in-depth interviews and focus group discussions, the study explored the underlying mechanisms, contextual nuances, and stakeholder perceptions that contribute to or hinder project completion. This explanatory approach aims to uncover the "why" and "how" behind the observed phenomena, providing a deeper understanding of the complexities involved (Creswell & Creswell, 2017).

The integration of both descriptive and explanatory research designs allowed for a more robust and nuanced exploration of the research questions. The descriptive aspect ensures a thorough documentation of the current state of private house association projects, while the explanatory component seeks to uncover the underlying dynamics and mechanisms shaping project completion.

3.3. Population and Sampling Design

3.3.1. Target Population of the Study

The target population for this study comprised the employees within the private house associations in Addis Ababa and the management overseeing construction projects within these associations. The study aims to capture perspectives from both operational staff and managerial personnel to obtain a comprehensive understanding of the factors influencing project completion.

This subgroup includes individuals actively involved in the day-to-day operations of construction projects within private house associations. This may encompass construction workers, site engineers, project coordinators, and other staff members directly engaged in the implementation of projects.

The management category involves individuals in leadership and decision-making roles within the private house associations. This includes project managers, association executives, and other managerial staff responsible for overseeing and guiding construction projects.

Sampling strategies was employed to select representative participants from both groups. The goal is to gather insights from those directly executing project tasks (employees) and those responsible for strategic decisions and project management (management). This dual focus ensures a comprehensive and well-rounded exploration of the factors influencing project completion within private house associations in Addis Ababa.

3.3.2. Sample Size Determination

For this study, a census approach was employed due to the manageable size of the target population. The total number of employees within the company, excluding labor workers, is 36 individuals. Therefore, all 36 employees were included as subjects in this study.

The decision to conduct a census is appropriate when the target population is small, and it is feasible to gather information from every individual within that population. In this case, the study aims to ensure the representation of all employees involved in the day-to-day operations of construction projects within private house associations in Addis Ababa.

This approach was facilitated a comprehensive examination of the perspectives and experiences of each employee, contributing to a detailed understanding of the factors influencing project completion within the private house association sector.

3.4. Data Gathering and Instruments

3.4.1. Source of Data

The study utilized both primary and secondary sources of data to comprehensively address the research objectives.

Primary Data:

A structured questionnaire was administered to the selected participants (employees and management) to collect quantitative data. The questionnaire included items related to collaborative project management, information sharing, advanced technologies, Lean construction practices, and project completion metrics. The responses was analyzed to identify patterns, trends, and associations.

Secondary Data:

Literature Review: Existing scholarly literature, academic journals, and relevant books served as secondary sources of information. A thorough review of the literature contributed to the theoretical framework, contextualize the study, and inform the research design.

The combination of primary and secondary data sources enhanced the rigor and validity of the study. Primary data collection methods directly captured the perspectives of participants, while secondary data sources contributed to the broader context and theoretical foundation of the research.

3.4.2. Instruments that was used

The study employed the following instruments for data collection:

Questionnaire:

A structured questionnaire was designed to gather quantitative data from the participants. The questionnaire included close-ended questions related to collaborative project management, information sharing, and the integration of advanced technologies, Lean construction practices, and project completion metrics. Likert scales, multiple-choice questions, and ranking scales may be utilized to capture participants' responses in a standardized format.

3.5. Methods of Data Collection and Analysis

3.5.1 Data Collection

Questionnaire Administration:

The structured questionnaire was distributed to the selected participants (employees and management) within the company. The questionnaire was administered in person or electronically, depending on the participants' preferences. Clear instructions was provided to ensure accurate and consistent responses.

3.5.2 Data Analysis

Quantitative Data Analysis:

The quantitative data collected through the questionnaire was analyzed using statistical methods. Descriptive statistics, such as frequencies, percentages, and averages, was employed to summarize the participants' responses. Inferential statistics, including correlation analysis and regression analysis, may be used to identify relationships between variables. The findings from quantitative analyses provided a comprehensive understanding of the factors influencing project completion.

3.6. Validity and Reliability of Instruments

3.6.1. Validity

Validity refers to the extent to which a study accurately measures or reflects the concepts it intends to assess. Ensuring the validity of the study involves adopting measures to support the accuracy and appropriateness of the research design, instruments, and data collection methods. Several strategies was employed to enhance the validity of this study:

Content Validity:

The questionnaire was developed based on a thorough review of relevant literature, ensuring that the items and questions align with the key constructs under investigation. The research instruments was critically examined by subject matter experts to assess their relevance and comprehensiveness.

Pilot Testing:

Before the actual administration of the instruments, a pilot test was conducted with a small group of participants from a similar population. This pre-testing helped identify any ambiguities, potential issues, or unclear items in the questionnaire or interview guides. Adjustments was made based on the feedback received.

Expert Review:

The research instruments were subjected to review by experts in the field, including researchers, practitioners, or academicians with expertise in construction project management. Their input was valuable in ensuring that the instruments effectively capture the intended constructs.

By incorporating these strategies, the study aims to enhance the validity of the research design, instruments, and data collection methods, ultimately contributing to the credibility and trustworthiness of the study's findings.

3.6.2. Reliability

Table 3.6.2. Cronbach Alpha

Variable	Number of Item	Cronbach's Alpha
Collaborative Project Management	5	0.968
Information Sharing	5	1.000
Integration of Advance Technologies	5	0.910
Implementation of Lean Construction	5	0.902
Project Completion	5	0.798
Overall	25	0.961

Source: Own data, 2024

Table 1 presents the results of the reliability test using Cronbach's alpha coefficient for various variables in the study, including Collaborative Project Management, Information Sharing, Integration of Advanced Technologies, Implementation of Lean Construction, Project Completion, and the overall scale.

Starting with Collaborative Project Management, the table indicates a Cronbach's alpha value of 0.968, which reflects a very high level of internal consistency among the items within this variable. This suggests that the items related to collaborative project management, which may include aspects such as teamwork, communication, and coordination, are highly correlated and measure the same underlying construct reliably.

Moving on to Information Sharing, the Cronbach's alpha value of 1.000 signifies perfect internal consistency among the items in this variable. This is an exceptional finding, indicating that the items related to information sharing within the context of the study, such as data exchange, knowledge dissemination, and communication channels, are not only highly correlated but also demonstrate absolute agreement in measuring the intended construct.

For the Integration of Advanced Technologies variable, the Cronbach's alpha coefficient is 0.910. This indicates a high level of internal consistency among the items related to the adoption and integration of advanced technologies in construction projects within private house associations. The items comprising this variable may include technology utilization, digital tools, automation, and technological innovation.

Similarly, the Implementation of Lean Construction variable shows a Cronbach's alpha value of 0.902, signifying strong internal consistency among the items related to lean construction

practices. These items may pertain to lean principles, waste reduction strategies, efficiency enhancement measures, and lean culture within project management contexts.

Moving to the Project Completion variable, the Cronbach's alpha value is 0.798, indicating good internal consistency but slightly lower than some other variables in the study. This variable likely encompasses aspects related to project timelines, budget adherence, quality standards, and overall project success indicators. While the reliability is still acceptable, it may be beneficial to explore individual item performance within this variable further.

Overall, when considering all variables together, the overall Cronbach's alpha for the scale is 0.961, which is indicative of excellent internal consistency across the entire set of items in the study. This reinforces the reliability and coherence of the measurement instrument used to assess the variables related to collaborative project management, information sharing, advanced technology integration, lean construction practices, and project completion within private house associations.

3.7. Ethical Considerations

Ethical considerations are paramount in any research endeavor, and this study is no exception. The ethical framework guiding this research is founded on principles of respect, transparency, and integrity. The following aspects underscore the ethical considerations inherent in the design and execution of this study:

Informed Consent: Prior to their involvement in the study, participants was provided with detailed information about the research's purpose, procedures, and potential implications. Their voluntary and informed consent was sought, ensuring that individuals are aware of their participation's nature and can make decisions freely. Confidentiality: All information collected from participants was treated with utmost confidentiality. Identifiers were removed from data sets to protect participants' privacy. Any data presented or published was aggregated to prevent the identification of individual participants.

Transparency: The research process was transparent, providing clear communication about the study's goals, methodologies, and potential implications. Participants were informed about how their data was used and the expected outcomes of the research. In adhering to these ethical considerations, the study seeks to conduct research that respects the dignity and rights of participants, ensures the integrity of the research process, and contributes ethically

sound knowledge to the academic and professional community. The ethical framework outlined here guided the research team throughout the study's lifecycle, promoting the responsible and respectful conduct of research.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1. Descriptive Analysis

4.1.1. General Characteristics of Respondents

Table 4.1.1 General Characteristics of Respondents

No	Item	Responses	
1	**Gender**	**Frequency**	**Percentage**
	Male	8	22.9%
	Female	27	77.1%
	Total	35	100%
2	**Age**	**Frequency**	**Percentage**
	21-26	7	20%
	27-33	11	30.6%
	>33	17	47.2%
	Total	35	100%
3	**Educational Background**	**Frequency**	**Percentage**
	Bachelor's Degree	8	22.2%
	MA and Above	27	77.1%
	Total	35	100%

Source: Own data, 2024

Table 2 provides an overview of the general characteristics of the respondents in terms of gender, age, and educational background. The table presents frequencies and percentages to depict the distribution of respondents across these demographic variables.

Starting with gender, the table shows that out of the total 35 respondents, 27 (77.1%) were female, while 8 (22.9%) were male. This indicates a significant representation of females in the respondent pool, reflecting a gender-diverse sample.

Regarding age demographics, the respondents were categorized into three age groups: 21-26, 27-33, and above 33. Among the respondents, 20% fell within the 21-26 age groups, 30.6% were in the 27-33 age range, and the majorities, 47.2%, were above 33 years old. This

distribution highlights a relatively diverse age representation, capturing individuals from early career stages to more experienced professionals.

In terms of educational background, respondents were categorized based on their highest attained degree. The table shows that 22.9% of respondents held a Bachelor's degree, while the majority, constituting 77.1%, had achieved a Master's degree or higher educational qualification. This indicates a highly educated respondent pool, likely comprising individuals with specialized knowledge and expertise relevant to the study's subject matter.

Overall, the descriptive analysis of respondents' general characteristics provides insights into the demographic composition of the sample. The gender distribution indicates a higher representation of females, while the age and educational background distributions reflect a diverse mix of respondents across different age groups and educational attainment levels. Understanding these demographic characteristics is essential for contextualizing the findings and considering potential demographic influences on the study variables related to collaborative project management, information sharing, advanced technology integration, lean construction practices, and project completion within private house associations.

4.1.2. Normality Tests

Table 4.1.2 Test of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Collaborative Project Management	.132	35	.130	.963	35	.276
Improved Information Sharing	.170	35	.012	.944	35	.074
Integration of Advanced Technologies	.125	35	.183	.972	35	.486
Implementation of Lean Construction	.122	35	.200*	.978	35	.693
Project Completion	.190	35	.002	.940	35	.055

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

In regression analysis, it is crucial to ensure that the assumptions underlying the model are met to obtain reliable and valid results. One of the fundamental assumptions is that the

residuals of the variables are normally distributed. To test this assumption, we employed two widely recognized tests for normality: the Kolmogorov-Smirnov test and the Shapiro-Wilk test. The results of these tests for five variables—Collaborative Project Management, Improved Information Sharing, Integration of Advanced Technologies, Implementation of Lean Construction, and Project Completion—are presented and interpreted below.

Kolmogorov-Smirnov Test

The Kolmogorov-Smirnov test assesses the normality of a distribution by comparing the sample distribution with a reference normal distribution. A significant result (p-value < 0.05) indicates that the distribution deviates from normality.

Collaborative Project Management: The test statistic is 0.132 with a p-value of 0.130. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, suggesting that the data is normally distributed.

Improved Information Sharing: The test statistic is 0.170 with a p-value of 0.012. The p-value is less than 0.05, indicating that the data deviates significantly from normality.

Integration of Advanced Technologies: The test statistic is 0.125 with a p-value of 0.183. As the p-value exceeds 0.05, we conclude that the data does not significantly deviate from normality.

Implementation of Lean Construction: The test statistic is 0.122 with a p-value of 0.200. Again, the p-value is greater than 0.05, indicating normality.

Project Completion: The test statistic is 0.190 with a p-value of 0.002. The p-value is less than 0.05, indicating a significant deviation from normality.

Shapiro-Wilk Test

The Shapiro-Wilk test is particularly recommended for small sample sizes as it provides a more powerful assessment of normality. A non-significant result (p-value > 0.05) indicates that the distribution is normal.

Collaborative Project Management: The Shapiro-Wilk statistic is 0.963 with a p-value of 0.276. As the p-value is greater than 0.05, we conclude that the data is normally distributed.

Improved Information Sharing: The Shapiro-Wilk statistic is 0.944 with a p-value of 0.074. Although the p-value is slightly above the threshold, it suggests that the data may be close to normally distributed.

Integration of Advanced Technologies: The Shapiro-Wilk statistic is 0.972 with a p-value of 0.486. This high p-value indicates that the data is normally distributed.

Implementation of Lean Construction: The Shapiro-Wilk statistic is 0.978 with a p-value of 0.693. This result strongly suggests normality.

Project Completion: The Shapiro-Wilk statistic is 0.940 with a p-value of 0.055. Although the p-value is just above 0.05, it is close enough to suggest the data might be borderline normal.

The results from both tests present a nuanced picture of the normality of our variables. The Kolmogorov-Smirnov test identified deviations from normality in the variables Improved Information Sharing and Project Completion, while the Shapiro-Wilk test suggested that these variables are closer to normality, particularly for Improved Information Sharing, where the p-value was 0.074.

For variables like Collaborative Project Management, Integration of Advanced Technologies, and Implementation of Lean Construction, both tests largely agree that the data is normally distributed. This consistency across tests strengthens our confidence in the normality of these variables.

The normality assumption appears to hold reasonably well for most of our variables, with the possible exception of Improved Information Sharing and Project Completion. Given that the Shapiro-Wilk test is more reliable for smaller samples, and considering that its results are close to indicating normality for Improved Information Sharing, we might cautiously proceed with regression analysis. However, we should be mindful of the potential non-normality in Project Completion and consider robust regression techniques or data transformation if necessary.

4.1.3. Assessment of Implementing Lean Concept and project completion

Table 4.1.3 Descriptive of Variables

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Collaborative Project Management	35	2.00	4.00	2.9714	.49739	.247
Improved information Sharing	35	1.60	3.60	2.8171	.43215	.187
Integration of Advanced Technologies	35	2.20	4.00	3.1200	.38562	.149
Implementation of Lean Construction	35	1.80	4.00	2.8629	.51966	.270
Project Completion	35	2.00	3.20	2.5429	.25004	.063
Valid N (list wise)	35					

Source Own data, 2024

Table 4 presents the descriptive statistics for the variables under study: Collaborative Project Management, Improved Information Sharing, Integration of Advanced Technologies, Implementation of Lean Construction, and Project Completion. The table includes the number of respondents (N), minimum and maximum values, mean, standard deviation, and variance for each variable. These statistics provide an overview of the central tendencies and variability within the data set.

The variable Collaborative Project Management has a mean score of 2.9714, with a standard deviation of 0.49739 and a variance of 0.247. The minimum and maximum values range from 2.00 to 4.00. This suggests that on average, respondents moderately agree that collaborative project management practices are being implemented. The relatively small standard deviation indicates that responses are fairly consistent around the mean.

Improved Information Sharing shows a mean score of 2.8171, with a standard deviation of 0.43215 and a variance of 0.187. The scores range from 1.60 to 3.60, indicating some variability in responses. The mean score suggests that respondents perceive information

sharing to be slightly above average, though there is more variation in how respondents view the effectiveness of information sharing practices.

The Integration of Advanced Technologies has a higher mean score of 3.1200, with a standard deviation of 0.38562 and a variance of 0.149. The scores for this variable range from 2.20 to 4.00, indicating that respondents generally agree that advanced technologies are being integrated into their projects. The higher mean compared to other variables suggests a stronger consensus on the positive impact of technology integration.

Implementation of Lean Construction has a mean score of 2.8629, with a standard deviation of 0.51966 and a variance of 0.270. The scores range from 1.80 to 4.00. This mean score indicates that respondents perceive the implementation of lean construction practices to be moderate, with a higher standard deviation reflecting more diverse opinions among respondents. Finally, Project Completion has a mean score of 2.5429, with a standard deviation of 0.25004 and a variance of 0.063. The scores range from 2.00 to 3.20. The mean score suggests that respondents view project completion performance as slightly below average. The low standard deviation indicates that there is relatively little variation in responses regarding project completion.

The analysis of these descriptive statistics provides valuable insights into the current state of implementing lean concepts and their impact on project completion within the context of private house associations in Addis Ababa. The moderately high mean scores for Collaborative Project Management, Improved Information Sharing, Integration of Advanced Technologies, and Implementation of Lean Construction suggest that these practices are recognized and implemented to varying degrees.

The relatively higher mean for the Integration of Advanced Technologies indicates that technological advancements are well-received and integrated, aligning with contemporary theories on the pivotal role of technology in enhancing project efficiency and effectiveness (Azhar, Khalfan, & Maqsood, 2012). This is consistent with the theory that technology adoption is crucial for modernizing construction processes and improving project outcomes (Jung & Joo, 2011).

The moderate mean scores for Collaborative Project Management and Improved Information Sharing highlight the importance of these practices in facilitating project success. Effective collaboration and information sharing are essential components of lean construction, as they

foster a more synchronized and efficient workflow, reducing waste and enhancing productivity (Koskela, 1992). These findings support the theory that lean construction principles, when implemented effectively, contribute to better project outcomes by streamlining communication and collaboration among stakeholders (Ballard & Howell, 2003).

However, the mean score for Project Completion suggests that there is room for improvement in completing projects on time and within budget. This could be indicative of challenges in fully realizing the benefits of lean construction practices, possibly due to incomplete implementation or resistance to change within organizations (Aziz & Hafez, 2013). The relatively low variance for Project Completion implies that while perceptions of project completion are consistent, they tend to be on the lower side, pointing to systemic issues that need to be addressed.

In conclusion, the descriptive statistics provide a foundational understanding of how lean concepts are currently perceived and implemented in the construction projects of private house associations in Addis Ababa. The insights derived from this analysis highlight the critical areas where improvements can be made to enhance project completion rates, thereby supporting the broader objective of optimizing construction project management through lean principles. Future research and practical applications should focus on strengthening collaborative practices, enhancing information sharing mechanisms, and fully integrating advanced technologies to achieve more successful project outcomes.

4.2. Parametric Tests

4.2.1. The Relationship of Implementing Lean Concepts and Project Completion

Table 4.2.1 Pearson's Correlation

		Project Completion
Collaborative Project Management	Pearson Correlation	.336*
	Sig. (2-tailed)	.048
	N	35
Improved Information Sharing	Pearson Correlation	.684**
	Sig. (2-tailed)	.000
	N	35
Integration of Advanced Technologies	Pearson Correlation	.464**
	Sig. (2-tailed)	.005

	N	35
Implementation of Lean Construction	Pearson Correlation	.164
	Sig. (2-tailed)	.346
	N	35
Project Completion	Pearson Correlation	1
	Sig. (2-tailed)	
	N	35

Source: Own data, 2024

Table 5 presents the Pearson's correlation coefficients for the relationship between implementing lean concepts and project completion. The table includes the correlation values, significance levels (Sig.), and the number of observations (N) for each variable.

Starting with Collaborative Project Management, the Pearson correlation coefficient is 0.336, with a significance level (p-value) of 0.048. This indicates a positive, moderate relationship between collaborative project management and project completion, which is statistically significant at the 0.05 level. This finding suggests that better collaboration among project teams is associated with higher project completion rates. The moderate correlation aligns with the theory that effective collaboration can enhance communication, reduce conflicts, and streamline project processes, leading to improved project outcomes (Anvuur & Kumaraswamy, 2007).

Improved Information Sharing shows a Pearson correlation coefficient of 0.684, with a p-value of 0.000, indicating a strong, positive relationship with project completion that is highly statistically significant. This strong correlation implies that effective information sharing significantly contributes to successful project completion. Effective information sharing can reduce misunderstandings, ensure that all stakeholders are well-informed, and facilitate timely decision-making, which are critical components of successful project management (Yang, Shen, Ho, Drew, & Chan, 2011).

The Integration of Advanced Technologies has a Pearson correlation coefficient of 0.464, with a p-value of 0.005, indicating a moderate, positive, and statistically significant relationship with project completion. This suggests that the integration of advanced technologies, such as Building Information Modeling (BIM), project management software, and other digital tools, is positively associated with successful project completion. The adoption of advanced technologies can improve efficiency, accuracy, and coordination in construction projects, leading to better project outcomes (Azhar, Khalfan, & Maqsood, 2012).

Implementation of Lean Construction shows a Pearson correlation coefficient of 0.164, with a p-value of 0.346, indicating a weak, positive, but not statistically significant relationship with project completion. This result suggests that while there is a positive association between lean construction practices and project completion, the relationship is not strong enough to be statistically significant in this sample. This finding may indicate that the implementation of lean construction practices alone may not be sufficient to significantly impact project completion without other supporting factors, such as strong leadership, effective training, and a culture of continuous improvement (Sacks, Koskela, Dave, & Owen, 2010).

The correlation analysis provides valuable insights into the relationships between different lean concepts and project completion within the context of private house associations in Addis Ababa. The strong positive relationship between improved information sharing and project completion underscores the critical importance of effective communication and knowledge dissemination in ensuring project success. This finding is consistent with the theory that robust information sharing mechanisms are essential for reducing errors, aligning stakeholder expectations, and facilitating collaborative problem-solving (Yang et al., 2011).

The moderate positive correlations of collaborative project management and integration of advanced technologies with project completion further emphasize the importance of teamwork and technological innovation in enhancing project outcomes. Effective collaboration among project teams can lead to better coordination, conflict resolution, and resource management, which are essential for completing projects on time and within budget (Anvuur & Kumaraswamy, 2007). Similarly, the integration of advanced technologies can streamline processes, enhance accuracy, and improve overall project efficiency, which are critical for successful project completion (Azhar et al., 2012).

The weak and non-significant relationship between the implementation of lean construction and project completion suggests that while lean practices are beneficial, their impact on project completion may be limited without other supporting elements. This finding highlights the need for a holistic approach to lean construction, where practices are complemented by strong leadership, continuous training, and a culture that supports lean principles (Sacks et al., 2010).

In conclusion, the correlation analysis indicates that effective information sharing, collaborative project management, and the integration of advanced technologies are key

factors that positively influence project completion in private house associations. These findings align with existing theories on the importance of communication, teamwork, and technological innovation in project management. However, the implementation of lean construction practices requires additional support to fully realize its potential impact on project outcomes. These insights provide a foundation for further research and practical applications aimed at enhancing project management practices and achieving successful project completion.

4.2.2. The Effect of Implementing Lean Concepts on Project Completion

4.2.2.1. Regression Analysis

Table 4.2.2.1 Variables Entered

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Implementation of Lean Construction, Integration of Advanced Technologies, Collaborative Project Management, Improved Information Sharing[b]	.	Enter

a. Dependent Variable: Project Completion
b. All requested variables entered.

Source: Own data, 2024

he regression analysis aims to explore the impact of various independent variables—Collaborative Project Management, Improved Information Sharing, Integration of Advanced Technologies, and Implementation of Lean Construction—on the dependent variable, Project Completion. Table 6 presents the variables that were included in the regression model and confirms that all requested variables were entered into the model.

The table indicates that no variables were removed during the analysis, which means that the model includes all the hypothesized predictors of project completion. This setup allows for a comprehensive examination of how each variable contributes to the successful completion of building construction projects within private house associations in Addis Ababa.

Table 4.2.2.2 Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.887[a]	.787	.758	.12290

a. Predictors: (Constant), Implementation of Lean Construction, Integration of Advanced Technologies, Collaborative Project Management, Improved Information Sharing

The model summary in Table 7 provides key statistics that describe the overall fit of the regression model, which includes the predictors: Collaborative Project Management, Improved Information Sharing, Integration of Advanced Technologies, and Implementation of Lean Construction.

Interpretation:

1. **R (Correlation Coefficient):** The correlation coefficient, denoted as *R*, is 0.887. This value indicates a very strong positive correlation between the independent variables (collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction) and the dependent variable (project completion). A correlation close to 1 suggests that as the combined predictors increase, the project completion rate also increases significantly.

2. **R Square (Coefficient of Determination):** The $R\,2R2$ value is 0.787. This means that approximately 78.7% of the variability in project completion can be explained by the model that includes the four independent variables. This high R^2value indicates a strong explanatory power of the model, suggesting that the included variables are good predictors of project completion.

3. **Adjusted R Square:** The Adjusted R^2 is 0.758. The adjusted $R\,2R2$ is a modified version of R^2that has been adjusted for the number of predictors in the model. It provides a more accurate measure of the model's explanatory power, particularly when multiple predictors are involved. An adjusted R^2 of 0.758 indicates that even after accounting for the number of predictors, the model still explains approximately 75.8% of the variance in project completion.

4. **Standard Error of the Estimate:** The standard error of the estimate is 0.12290. This statistic measures the average distance that the observed values fall from the regression line. A lower standard error indicates a better fit of the model to the data. In this context, a standard error of 0.12290 suggests that the model's predictions are relatively precise.

The model summary indicates that the regression model, which includes collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction, is highly effective in predicting project completion. The high R 2R2 and adjusted R 2R2 values demonstrate that these variables collectively account for a substantial proportion of the variance in project completion.

This strong model fit is consistent with theoretical expectations and empirical evidence from previous studies. For instance, Yang et al. (2011) found that effective information sharing significantly improves project performance, which aligns with the high explanatory power observed in this model. Similarly, Azhar et al. (2012) emphasized the positive impact of advanced technologies on project efficiency and outcomes, supporting the model's findings.

The practical implications of this model are significant for project managers and stakeholders in the construction industry. By focusing on enhancing collaborative project management, improving information sharing mechanisms, integrating advanced technologies, and implementing lean construction practices, organizations can significantly improve their project completion rates. These findings provide a robust framework for developing targeted strategies to enhance project performance and achieve successful outcomes.

In conclusion, the model summary from the regression analysis confirms that the independent variables included in the study are strong predictors of project completion. The high R R, R 2R2, and adjusted R 2R2 values, along with the low standard error, indicate a well-fitting model that can reliably guide efforts to improve project management practices in the construction industry, particularly within private house associations in Addis Ababa.

Table 4.2.2.3 Analysis of Variance

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	1.673	4	.418	27.684	.000[b]
	Residual	.453	30	.015		
	Total	2.126	34			

a. Dependent Variable: Project Completion
b. Predictors: (Constant), Implementation of Lean Construction, Integration of Advanced Technologies, Collaborative Project Management, Improved Information Sharing

The ANOVA table provides details about the overall significance of the regression model. It includes the sum of squares, degrees of freedom (df), mean square, F-value, and significance (Sig.) for the regression and residual.

Sum of Squares:

Regression: The sum of squares due to regression is 1.673. This represents the total variation in project completion explained by the independent variables: collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction.

Residual: The sum of squares due to residuals is 0.453. This value represents the variation in project completion that is not explained by the model.

Total: The total sum of squares is 2.126, which is the sum of the regression and residual sums of squares. This represents the total variation in project completion across all observations.

Degrees of Freedom (df):

Regression: The degrees of freedom for the regression is 4, corresponding to the number of independent variables included in the model.

Residual: The degrees of freedom for the residual are 30, calculated as the total number of observations (35) minus the number of predictors (4) minus one.

Total: The total degrees of freedom are 34, representing the total number of observations minus one.

Mean Square:

Regression: The mean square for the regression is 0.418, calculated by dividing the regression sum of squares by its degrees of freedom (1.673/4).

Residual: The mean square for the residual is 0.015, calculated by dividing the residual sum of squares by its degrees of freedom (0.453/30).

F-Value: The F-value is 27.684, indicating the ratio of the mean regression sum of squares to the mean residual sum of squares. A higher F-value indicates a greater proportion of the variance in the dependent variable (project completion) is explained by the independent variables, relative to the unexplained variance.

Significance (Sig.): The significance level is 0.000, which is less than 0.05. This indicates that the regression model is statistically significant, meaning the independent variables collectively have a significant impact on project completion.

The ANOVA results indicate that the regression model is statistically significant, with an F-value of 27.684 and a p-value of 0.000. This implies that the combined effects of collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction practices significantly explain the variation in project completion.

The significance of the model underscores the importance of these independent variables in predicting successful project completion. Collaborative project management enhances team coordination and reduces conflicts, which is crucial for meeting project deadlines and objectives (Anvuur & Kumaraswamy, 2007). Improved information sharing ensures that all stakeholders are well-informed and can make timely decisions, reducing delays and misunderstandings (Yang et al., 2011). The integration of advanced technologies streamlines processes, improves accuracy, and increases overall project efficiency (Azhar et al., 2012). Lastly, the implementation of lean construction practices minimizes waste and maximizes value, contributing to better project outcomes (Sacks et al., 2010).

The high significance of the regression model confirms that these factors are essential for achieving successful project completion in the context of building construction projects within private house associations in Addis Ababa. Project managers and stakeholders can leverage these insights to focus on enhancing collaboration, communication, technology adoption, and lean practices to improve project performance.

In conclusion, the ANOVA analysis supports the hypothesis that collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction practices significantly impact project completion. These findings are consistent with existing theories and empirical studies, providing a strong foundation for developing effective project management strategies in the construction industry.

Table 4.2.2.4. Coefficients of Variables

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.074	.279		-.263	.794
	Collaborative Project Management	.264	.044	.525	5.948	.000
	Improved Information Sharing	.400	.054	.692	7.411	.000
	Integration of Advanced Technologies	.154	.058	.237	2.630	.013
	Implementation of Lean Construction	.079	.042	.163	1.863	.072

a. Dependent Variable: Project Completion

The table of coefficients provides detailed information about the relationship between each independent variable and the dependent variable, which in this case is project completion. The table includes unstandardized coefficients (B), standard errors, standardized coefficients (Beta), t-values, and significance (Sig.) values.

Constant (Intercept):

B: The constant term is -0.074. This is the expected value of project completion when all independent variables are equal to zero. Although this value is not significant (Sig. = 0.794), it serves as a baseline for the regression model.

Collaborative Project Management:

B: The unstandardized coefficient is 0.264. This indicates that for every one-unit increase in collaborative project management, project completion is expected to increase by 0.264 units, assuming all other variables are held constant.

Beta: The standardized coefficient is 0.525. This shows the relative strength of collaborative project management in predicting project completion, compared to other variables.

t-value: The t-value is 5.948, and the p-value (Sig.) is 0.000, indicating that the effect of collaborative project management on project completion is statistically significant.

Improved Information Sharing:

B: The unstandardized coefficient is 0.400. This means that for every one-unit increase in improved information sharing, project completion is expected to increase by 0.400 units, all else being equal.

Beta: The standardized coefficient is 0.692, indicating a strong positive effect on project completion.

t-value: The t-value is 7.411, with a p-value of 0.000, suggesting a highly significant impact of improved information sharing on project completion.

Integration of Advanced Technologies:

B: The unstandardized coefficient is 0.154, meaning that a one-unit increase in the integration of advanced technologies corresponds to a 0.154 unit increase in project completion.

Beta: The standardized coefficient is 0.237, indicating a moderate positive relationship.

t-value: The t-value is 2.630, with a p-value of 0.013, indicating a statistically significant impact.

Implementation of Lean Construction:

B: The unstandardized coefficient is 0.079. This implies that a one-unit increase in the implementation of lean construction is associated with a 0.079 unit increase in project completion.

Beta: The standardized coefficient is 0.163, showing a relatively smaller but positive effect.

t-value: The t-value is 1.863, with a p-value of 0.072. This p-value is slightly above the conventional threshold of 0.05, suggesting that the impact of lean construction implementation is marginally significant.

The regression coefficients provide a detailed understanding of how each independent variable affects project completion in the context of building construction projects within private house associations in Addis Ababa. The results indicate that all four independent variables positively influence project completion, with varying degrees of significance

The most substantial predictor is improved information sharing (Beta = 0.692), highlighting its critical role in ensuring successful project outcomes. This finding aligns with the study by Yang et al. (2011), which emphasizes the importance of effective communication in project management. Enhanced information sharing facilitates better decision-making, reduces delays, and minimizes misunderstandings, thereby improving project completion rates.

Collaborative project management also shows a strong positive effect (Beta = 0.525). Effective collaboration among team members and stakeholders leads to better coordination, resource allocation, and conflict resolution, which are essential for timely and successful project completion (Anvuur & Kumaraswamy, 2007).

The integration of advanced technologies (Beta = 0.237) has a significant positive impact on project completion. This result is consistent with the findings of Azhar et al. (2012), who demonstrated that advanced technologies, such as Building Information Modeling (BIM), enhance project efficiency, accuracy, and overall performance.

Although the implementation of lean construction practices has a positive effect (Beta = 0.163), its significance is marginal (p = 0.072). This suggests that while lean construction principles are beneficial, their impact may be less pronounced in comparison to other factors. Sacks et al. (2010) also found that lean practices contribute to improved project outcomes, but their effectiveness can vary based on implementation and context.

The regression analysis confirms that collaborative project management, improved information sharing, integration of advanced technologies, and implementation of lean construction practices positively influence project completion. These findings provide empirical support for the hypotheses and underscore the importance of these variables in achieving successful project outcomes. Project managers and stakeholders in the construction

industry can leverage these insights to enhance project performance and ensure timely completion.

4.4. Hypothesis Testing

The hypotheses proposed in this study aimed to investigate the relationship between key factors, including collaborative project management, information sharing, integration of advanced technologies, implementation of lean construction practices, and project completion within Fetish Construction projects within private house associations in Addis Ababa.

Hypothesis 1 (H1): Collaborative Project Management and Project Completion:

H1 stated that collaborative project management positively affects project completion in Fetish Construction within private house associations in Addis Ababa.

The regression analysis results provided strong support for H1, revealing a significant positive relationship between collaborative project management and project completion (Beta = 0.525, $p < 0.001$). This indicates that effective collaboration among project team members and stakeholders significantly contributes to successful project outcomes.

Hypothesis 2 (H2): Information Sharing and Project Completion:

H2 posited that information sharing positively impacts project completion in the context of Fetish Construction.

The regression analysis findings strongly supported H2, indicating a highly significant positive relationship between improved information sharing and project completion (Beta = 0.692, $p < 0.001$). This suggests that efficient sharing of information among project participants is crucial for achieving timely and successful project completion.

Hypothesis 3 (H3): Integration of Advanced Technologies and Project Completion:

H3 hypothesized that the integration of advanced technologies positively affects project completion within Fetish Construction.

The regression analysis results provided significant support for H3, revealing a positive relationship between the integration of advanced technologies and project completion (Beta =

0.237, p = 0.013). This suggests that leveraging advanced technologies in construction processes enhances project efficiency and contributes to improved project outcomes.

Hypothesis 4 (H4): Implementation of Lean Construction Practices and Project Completion:

H4 proposed that the implementation of lean construction practices positively affects project completion in Fetish Construction within the private house association sector.

Although the regression analysis indicated a positive relationship between lean construction practices and project completion (Beta = 0.163), the significance level was marginal (p = 0.072). This suggests that while lean practices may contribute to better project outcomes, their impact may be less pronounced compared to other factors in this context.

The results of hypothesis testing provide empirical evidence supporting the significant positive impact of collaborative project management, information sharing, and integration of advanced technologies on project completion within Fetish Construction projects in Addis Ababa. However, while lean construction practices also exhibit a positive association with project completion, their significance level was slightly lower. These findings underscore the importance of effective collaboration, communication, technological integration, and lean principles in achieving successful project outcomes in the construction industry.

4.5. Discussion of Results

The findings of this study shed light on the significant factors influencing project completion within Fetish Construction projects in private house associations in Addis Ababa. Through regression analysis and hypothesis testing, the relationships between collaborative project management, information sharing, integration of advanced technologies, implementation of lean construction practices, and project completion were examined. The discussion below synthesizes these results in the context of existing literature and offers insights for practice and future research.

The results provide robust support for the positive impact of collaborative project management on project completion (Beta = 0.525, p < 0.001), aligning with prior research emphasizing the importance of teamwork and cooperation in construction projects (Anvuur & Kumaraswamy, 2007). Effective collaboration among project stakeholders fosters better

communication, coordination, and problem-solving, ultimately leading to improved project outcomes.

The findings highlight the critical role of information sharing in facilitating project completion (Beta = 0.692, $p < 0.001$). Efficient sharing of information among project participants enhances decision-making, reduces misunderstandings, and accelerates project progress (Yang et al., 2011). These results underscore the significance of transparent communication channels and effective knowledge management practices in construction projects. The study reveals a positive relationship between the integration of advanced technologies and project completion (Beta = 0.237, $p = 0.013$), consistent with previous research on the benefits of technology adoption in construction (Azhar et al., 2012). Advanced technologies such as Building Information Modeling (BIM) streamline processes, enhance accuracy, and improve project efficiency, contributing to successful project outcomes.

While the implementation of lean construction practices shows a positive association with project completion (Beta = 0.163), its significance level is marginally lower ($p = 0.072$). This suggests that while lean principles contribute to project efficiency and value maximization (Sacks et al., 2010), their impact may be less pronounced compared to other factors in this context. Further exploration is warranted to understand the nuances of lean implementation and its effectiveness in Fetish Construction projects.

The findings underscore the importance of prioritizing collaborative project management, information sharing, and technology integration in construction project management practices. Project managers and stakeholders should emphasize building strong collaborative relationships, implementing effective communication strategies, leveraging advanced technologies, and integrating lean principles to enhance project performance and ensure timely completion. Future research could explore the specific mechanisms through which collaborative project management, information sharing, technology integration, and lean practices influence project completion in Fetish Construction projects. Additionally, longitudinal studies could investigate the long-term effects of these factors on project outcomes and assess their sustainability over time.

In conclusion, the findings of this study provide valuable insights into the factors influencing project completion in Fetish Construction projects within private house associations in Addis

Ababa. By understanding the significance of collaborative project management, information sharing, technology integration, and lean practices, stakeholders can develop targeted strategies to improve project performance and achieve successful outcomes.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1. Summary of Major Findings

The study investigated the factors influencing project completion within Fetish Construction projects in private house associations in Addis Ababa. Through quantitative analysis and hypothesis testing, several key findings emerged, shedding light on the critical aspects of project management and construction practices. The summary below encapsulates the major findings of the study:

Collaborative project management significantly affects project completion (Beta = 0.525, $p < 0.001$). Effective collaboration among project stakeholders fosters better communication, coordination, and problem-solving, contributing to successful project outcomes.

Improved information sharing positively impacts project completion (Beta = 0.692, $p < 0.001$). Efficient sharing of information enhances decision-making, reduces misunderstandings, and accelerates project progress.

The integration of advanced technologies positively affects project completion (Beta = 0.237, $p = 0.013$). Advanced technologies such as Building Information Modeling (BIM) streamline processes, enhance accuracy, and improve project efficiency.

Implementation of lean construction practices shows a positive association with project completion (Beta = 0.163), although its significance level is marginally lower (p = 0.072). Lean principles contribute to project efficiency and value maximization, but their impact may be less pronounced compared to other factors.

These findings underscore the significance of effective project management strategies, including collaborative approaches, transparent communication channels, technological integration, and lean practices, in achieving successful project outcomes within Fetish Construction projects in Addis Ababa. The study's major findings highlight the multifaceted nature of project completion in construction projects and emphasize the importance of addressing various aspects of project management and construction practices.

5.2. Conclusions

In the pursuit of understanding the dynamics of project completion within Fetish Construction projects in private house associations in Addis Ababa, this study embarked on a comprehensive investigation into the influence of collaborative project management, information sharing, integration of advanced technologies, and implementation of lean construction practices. Through rigorous analysis and hypothesis testing, several noteworthy conclusions have emerged, providing valuable insights for both theory and practice in the construction industry.

Firstly, the findings unequivocally affirm the pivotal role of collaborative project management in driving successful project outcomes. The positive relationship between collaborative project management and project completion underscores the importance of fostering teamwork, cooperation, and communication among project stakeholders. Effective collaboration not only enhances coordination and decision-making but also cultivates a shared sense of responsibility and ownership, leading to improved project performance.

Secondly, the study elucidates the transformative impact of improved information sharing on project completion. The strong positive correlation between information sharing and project completion highlights the critical need for transparent communication channels, knowledge dissemination, and information exchange within construction projects. Enhanced information

sharing facilitates informed decision-making, minimizes errors and delays, and accelerates project progress, thereby enhancing overall project outcomes.

Furthermore, the integration of advanced technologies emerges as a driving force behind project success in the construction industry. The findings underscore the significant positive relationship between technology integration and project completion, emphasizing the transformative potential of technologies such as Building Information Modeling (BIM) and digital tools in streamlining construction processes, enhancing productivity, and ensuring project efficiency.

However, while lean construction practices demonstrate a positive association with project completion, their impact appears to be marginally less pronounced compared to other factors. While lean principles contribute to operational efficiency and value maximization, their effectiveness may vary depending on implementation strategies and contextual factors within Fetish Construction projects.

In conclusion, this study contributes valuable insights into the multifaceted nature of project completion within Fetish Construction projects in Addis Ababa. By elucidating the critical role of collaborative project management, information sharing, technology integration, and lean practices, the study offers practical guidance for stakeholders in optimizing project performance and ensuring timely and successful project delivery. Moving forward, future research endeavors should delve deeper into the nuances of these factors and explore innovative strategies to further enhance project outcomes in the construction industry.

5.3. Recommendations

In the context of Fetish Construction projects within private house associations in Addis Ababa, the recommendations stemming from the major findings of this study provide a strategic roadmap for enhancing project completion outcomes and overall project management effectiveness. These recommendations are grounded in the empirical insights gained through an in-depth analysis of factors such as Collaborative Project Management (CPM), Information Sharing (IIS), Integration of Advanced Technologies (IAT), and Implementation of Lean Construction (ILC). This essay-style discussion elaborates on these recommendations to offer actionable insights for stakeholders and decision-makers in the construction industry.

Enhance Collaborative Practices

Enhancing collaboration practices emerges as a critical recommendation based on the study's findings. Establishing a collaborative culture among project stakeholders is paramount, emphasizing open communication, shared objectives, and mutual accountability. Leveraging collaborative project management tools and agile methodologies can streamline workflows, foster real-time collaboration, and improve decision-making processes. By embracing collaboration as a core value, project teams can enhance coordination, mitigate conflicts, and ultimately drive project success. According to Pinto and Slevin (1987), effective

collaboration is a key factor in project success, as it facilitates better coordination and integration of project activities.

Invest in Advanced Technologies

Investing in advanced technologies is another key recommendation highlighted by the study's findings. The adoption of technologies such as Building Information Modeling (BIM), Internet of Things (IoT) devices, and automated project management systems can revolutionize project execution and monitoring. However, mere adoption is not sufficient; organizations must also invest in training and upskilling initiatives to empower their workforce to harness the full potential of these technologies. By leveraging advanced technologies strategically, project teams can achieve higher levels of efficiency, accuracy, and innovation throughout the project lifecycle. Eastman et al. (2018) emphasize the transformative impact of BIM on construction project management, enabling better visualization, coordination, and planning.

Optimize Information Sharing Practices

Optimizing information sharing practices is equally imperative for improving project completion outcomes. Developing standardized protocols, leveraging digital platforms for data exchange, and promoting a culture of knowledge sharing can enhance transparency, reduce information silos, and facilitate informed decision-making. Effective information sharing ensures that stakeholders are well-informed, aligned with project objectives, and equipped to address challenges proactively, leading to smoother project execution and better outcomes. According to Zhang et al. (2014), effective information sharing is crucial for project success, as it improves communication, coordination, and decision-making among project stakeholders.

Refine Lean Construction Implementation Strategies

The study's findings also call for a refinement of lean construction implementation strategies. While lean principles hold promise in reducing waste and improving efficiency, their direct impact on project completion was not statistically significant in this context. Hence, organizations should conduct comprehensive reviews of their lean implementation strategies, engage stakeholders in continuous improvement initiatives, and align lean practices with project goals and industry best practices. By embracing a culture of continuous improvement

and waste reduction, organizations can enhance project outcomes and foster a culture of operational excellence. Koskela (2000) highlights the importance of adapting lean construction principles to specific project contexts to achieve optimal results.

Foster Collaborative Research and Industry Partnerships

Collaborative research initiatives and industry partnerships are also recommended to foster innovation, knowledge exchange, and best practice sharing within the construction industry. Engaging with academia, participating in industry forums, and networking with peers enable organizations to stay abreast of industry developments, leverage emerging technologies, and stay competitive in a rapidly evolving market landscape. Collaboration and knowledge-sharing platforms provide avenues for learning from industry experts, sharing experiences, and collectively addressing industry challenges. According to Chan et al. (2004), industry partnerships and collaborations can significantly enhance innovation and performance in construction projects.

Monitor and Evaluate Project Performance

Monitoring and evaluating project performance is essential to ensure that the implemented strategies are effective and aligned with project goals. Regular performance reviews, progress tracking, and feedback mechanisms can help identify areas for improvement, address issues promptly, and ensure that projects stay on track. Implementing robust performance management systems and key performance indicators (KPIs) can provide valuable insights into project health and facilitate data-driven decision-making. As noted by Kerzner (2017), continuous monitoring and evaluation are critical components of successful project management.

Embrace Continuous Learning and Innovation

Finally, fostering a culture of continuous learning and innovation is crucial for staying competitive and adapting to industry changes. Encouraging employees to pursue professional development opportunities, attend training programs, and engage in industry research can enhance their skills and knowledge. Organizations should also promote a mindset of innovation, encouraging employees to explore new ideas, experiment with novel approaches, and contribute to organizational growth. According to Nonaka and Takeuchi (1995), a

knowledge-creating organization thrives on continuous learning and innovation, leading to sustained competitive advantage.

In conclusion, the recommendations derived from the study's major findings offer a holistic approach to enhancing project completion outcomes within Fetish Construction projects. By prioritizing collaboration, leveraging advanced technologies, optimizing information sharing, refining lean practices, monitoring performance, and embracing continuous learning and innovation, organizations can navigate complexities, mitigate risks, and achieve project success in the dynamic construction industry landscape of Addis Ababa and beyond. These recommendations should be integrated into strategic project management frameworks, emphasizing stakeholder engagement, data-driven decision-making, and a culture of continuous improvement and adaptation.

5.4. Suggestions for Future Studies

While this study provides valuable insights into the factors influencing project completion within Fetish Construction projects in private house associations in Addis Ababa, several avenues for future research merit exploration. The following suggestions offer potential directions for further investigation:

Longitudinal Studies: Future research could adopt longitudinal designs to examine the long-term effects of collaborative project management, information sharing, technology integration, and lean construction practices on project completion. Tracking project outcomes over extended periods would provide deeper insights into the sustainability and durability of these factors.

Lean Construction Optimization: Studies focusing on optimizing lean construction practices and methodologies could offer practical insights for enhancing project performance. By identifying barriers to lean implementation, refining lean techniques, and integrating lean principles with other project management approaches, researchers can foster continuous improvement in construction project delivery.

Sustainability Considerations: Exploring the intersection of project completion and sustainability in construction projects could be a fruitful area for future investigation. Examining how sustainable practices, materials, and designs impact project completion outcomes would align with emerging trends in environmentally conscious construction.

Qualitative Inquiry: Complementing quantitative analyses with qualitative inquiry methods, such as interviews, focus groups, and case studies, could provide richer insights into the lived experiences and perceptions of project stakeholders. Qualitative research approaches would deepen our understanding of the underlying mechanisms driving project completion dynamics.

In conclusion, future studies exploring these avenues would contribute to advancing knowledge in construction project management and enhancing project completion practices. By addressing these research gaps, researchers can further refine project management theories, inform industry practices, and ultimately improve project outcomes in the construction sector.

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APPENDIX

Appendix I

ST. MARYS UNIVERSITY
SCHOOL OF POST GRADUATES
FACULTY OF BUSINESS
DEPARTMENT OF MANAGMENT

Dear respondent

I am currently conducting research as part of a fulfillment of the requirements for the course **Research.** The purpose of the research is to assess the . All information obtained will be used for academic purpose only. Hence, be assured that your responses will not be revealed to anyone. Please answer all the questions, as they are vital for the success of this research. Thank you in advance for your utmost cooperation.

1. Personal Information

1.1. ***Sex*** Male ☐ Female ☐

1.2. ***Age*** 21-26 ☐ 27-32 ☐ >33 ☐

33-38 ☐ 39-44 ☐ Above 44 ☐

1.3. Educational Background

High school Diploma and Below ☐ Currently enrolled in University ☐ Ma and Above ☐

SA- Strongly Agree **A**- Agree **N**- Neutral **D**- Disagree **SD**- Strongly Disagree

The following statements relate to your perceptions. Please indicate the extent to which you agree or disagree with each statement by selecting one of the options below:

	Collaborative Project Management	***SD***	***D***	***N***	***A***	***SA***
1.	Team members in our projects actively collaborate and share ideas to achieve common goals."					
2.	There is open communication among stakeholders, fostering a collaborative working environment.					
3.	Project decisions are made collectively with input from all relevant parties.					
4.	We have established effective teamwork practices that enhance project efficiency.					
5.	Collaborative problem-solving is encouraged, leading to innovative solutions and improved project outcomes.					
	Improved Information Sharing					
6.	Information relevant to project tasks is readily accessible to all team members.					
7.	Regular meetings and updates ensure that stakeholders are well-informed about project progress.					
8.	We utilize digital platforms to facilitate seamless sharing of documents and data.					
9.	Lessons learned from previous projects are documented and shared to inform future initiatives.					
10.	Feedback loops are in place to ensure that information flows efficiently across project teams.					
	Integration of Advanced Technologies					
11.	We leverage state-of-the-art software and tools to streamline project workflows.					
12.	Advanced technologies such as Building Information Modeling (BIM)					

	enhance project visualization and coordination.					
13.	Automated processes and digital simulations optimize resource allocation and project scheduling.					
14.	Real-time data analytics help us monitor project performance and identify areas for improvement.					
15.	The integration of technology has led to cost savings and improved project efficiency.					
	Implementation of Lean Construction					
16.	We prioritize value stream mapping and waste reduction strategies to optimize project processes.					
17.	Continuous improvement initiatives are embedded in our project management approach.					
18.	Just-in-time delivery and lean scheduling practices minimize project delays and disruptions.					
19.	Our teams actively engage in lean training and workshops to foster a culture of continuous learning.					
20.	Lean construction principles drive our decision-making processes, leading to enhanced project quality and client satisfaction.					
	Project Completion					
21.	Projects are consistently completed within the scheduled timeline and budget constraints.					
22.	Stakeholders are satisfied with the quality of deliverables and overall project outcomes.					
23.	Effective project management practices contribute to high rates of on-time project completion.					
24.	Clients commend our ability to meet project milestones and deliver results that exceed expectations.					
25.	Successful project completions serve as a testament to our team's dedication and collaborative efforts.					

Thanks once again for your upmost cooperation!!!

ሴንት ሜሪስ ዩኒቨርሲቲ
የ ድህረ ምረቃ ትምህርት ቤት
ፋኩልቲ ኦፍ ቢዝነ ስ

ክቡር ሜልስ ሰጪ

በአሁኑ ጊዜ ምርምር ለሜድረግ የሚያስፈልጉትን ብቃቶች ለሞሟላት ምርምር እያካሄድኩ **ነ ው።** የ ምር ምርምሩ ዓላማበተሳካ ሁኔታ ፕሮጀክት ለማጠናቀቅ ተግባራዊ የሚሆን ልቅ ጽንሰ-ሀሳብ ለማ ምማ ም ነ ው፡ የተገ ኘው ሚጃ በሜሉ ለትምህርት ብቻ ይውላል። ስለዚህ የሰጠኸው ሜልስ ለማ ም እንደሜይገ ለጥ እርግጠኛ ሁን ። ለዚህ ምርምር ስኬታማ ት በጣም አስፈላጊ ስለሆኑ እባካችሁ ለጥያቄዎቹ በሜሉ ሜልስ ስጡ ። ላደረጋችሁት ከፍተኛ ትብብር አስቀድማችሁ አማሰግናችኋለሁ።

1. የ ግል ሚጃ

1. ***ፆታ*** ወንድ ☐ ሴት☐

2. ***እድሜ*** 21-2☐ 27-32☐ >33☐

33-38☐ 39-44☐ በላይ 44 ☐

2. የ ትምህርት አ ማካኝ

የ ሁለተኛ ደረጃ ትምህርት ቤት ዲፕሎማ☐ ከዚህ በታች በአሁኑ ወቅት ይ☐ቨርሲቲ ውስጥ ተመዝግበዋል

☐

ማስተርስ ዲግሪ እና በላይ

SA- በጥቅ**ስ**ማ**A**- ተስማሙ **N**- ገለልተኛ **D**- አለመግባት **SD**- አለመግባት

የ ሚከተሉት ሐሳቦች ከአንተ አመለካከት ጋር የ ተያያዙ ናቸው። ከታች ከተዘረዘሩት አማራጮች መካከል አንዱን በመምረጥ ከእያንዳንዱ ሐሳብ ጋር ምን ያህል እንደምትስማማ ወይም እንደምትስማማእባክህ ጠቁም.

	የ ትብብር ፕሮጀክት አስተዳደር	***SD***	***D***	***N***	***A***	***SA***
1.	በፕሮጀክቶቻችን ውስጥ ያሉ የ ቡድን አባላት የ ጋራ ግቦችን ለማሳካት በንቃት ይተባበራሉ እና ሃሳቦችን ያካፍላሉ።					
2.	በባለድርሻ አካላት መካከል ግልጽ የሆነ ግንኙነት አለ, የ ትብብር የ ስራ አካባቢን ማሻሻል.					
3.	የ ፕሮጀክት ውሳኔዎች ከሁሉም የ ሚመለከታቸውአካላት ግብዓት ጋር በጋራ ይወሰዳሉ።					
4.	የ ፕሮጀክት ቅልጥፍናን የ ሚያጎለብቱ ውጤታማ የ ቡድን ስራ ልምዶችን ማስተናገል።					
5.	ወደ ፈጠራ መፍትሄዎች እና የ ተሻሻሉ የ ፕሮጀክት ውጤቶች እንዲመሩ በመድረግ ተባብሮ ችግር መፍታት ይበረታታል።					
	የ ተሻሻለ የ ሚጂ መገራት					
6.	ከፕሮጀክት ተግባራት ጋር ተዛመጅነት ያለው ሚጂ ለሁሉም የ ቡድን አባላት በቀላሉ ተደራሽ ነው።					
7.	መደበኛ ስብሰባዎች እና ማሻሻያዎች ባለድርሻ አካላት ስለፕሮጀክት ሂደት በደንብ እንዲያውቁ ያረጋግጣሉ።					
8.	እንከን የ ለሽ ሰነዶችን እና ሚጂዎችን መገራትን ለመምቻቸት ዲጂታል መድረኮችን እንጠቀማለን።					
9.	ከቀደምት ፕሮጀክቶች የ ተሞክሮ ትምህርቶች ተመዝግበው ወደፊት					

	የሚደረጉትን ተነሳሽነት ለማነወቅ ይጋራሉ።					
10.	ሚጃ በፕሮጀክት ቡድኖች ውስጥ በብቃት ሜዳን ለሚጋገጥ የግብረሜልስ ምልልሶች ተዘጋጅተዋል።					
	የተራቀቁ ቴክኖሎጂዎች ውህደት					
11.	የፕሮጀክት የስራ ሂደቶችን ለማቀላጠፍ ዘመናዊ ሶፍትዌሮችን እና መሳሪያዎችን እንጠቀማለን።					
12.	እንደ የግንባታ ሚጃ ሞዴል (BIM) ያሉ የላቁ ቴክኖሎጂዎች የፕሮጀክት እይታን እና ቅንጅትን ያሻሽላሉ።					
13.	አውቶሜድ ሂደቶች እና ዲጂታል ማስመሰያዎች የሀብት ምደባ እና የፕሮጀክት ሚሐግብርን ያመቻቻሉ።					
14.	የእውነተኛ ጊዜ ሚጃ ትንተና የፕሮጀክት አፈጻጸምን እንድንከታተል እና ማሻሻል ያለባቸውን ቦታዎች እንድንለይ ይረዳናል።					
15.	የቴክኖሎጂ ውህደት ወጪቁጠባ እና የተሻሻለ የፕሮጀክት ቅልጥፍናን አስከትሏል.					
	የሊን ኮንስትራክሽን አተገባበር					
16.	የፕሮጀክት ሂደቶችን ለማመቻቸት የእሴት ፍሰት ካርታ እና የቆሻሻ ቅነሳ ስልቶችን እናስቀድማለን።					
17.	ቀጣይነት ያለውየማሻሻያ ውጥኖች በፕሮጀክት አስተዳደር አካሄዳችን ውስጥገብተዋል።					
18.	ልክ በጊዜ ሚድረስ እና ዘንበል ያለ የሚሃግብር አሰራር የፕሮጀክት ማዘግየቶችን እና ማነቃቆሎችን ይቀንሳል።					
19.	ቀጣይነት ያለውየመሪ ባህልን ለማዳበር ቡድኖቻችን በጠንካራ ስልጠና እና ወርክሾፖች ላይ በንቃት ይሳተፋሉ።					
20.	ዘንበል ያለ የግንባታ ሚሆዎች የውሳኔ አሰጣጥ ሂደቶቻችንን ያንቀሳቅሳሉ፣ ይህም ወደ የተሻሻለ የፕሮጀክት ጥራት እና የደንበኛ እርካታ ያሚራል።					
	የፕሮጀክት ማጠናቀቅ					
21.	ፕሮጀክቶች በተያዘላቸው የጊዜ ገደብ እና የበጀት ገደቦች ውስጥ በተከታታይ ይጠናቀቃሉ።					
22.	ባለድርሻ አካላት በአቅርቦት ጥራት እና በአጠቃላይ የፕሮጀክት ውጤቶች ረክተዋል.					
23.	ውጤታማ የፕሮጀክት አስተዳደር ልምምዶች በጊዜ ላይ ለሚደረገው የፕሮጀክት ማጠናቀቂያ ከፍተኛ ፍጥነት አስተዋፅኦ ያደርጋሉ።					
24.	ደንበኞቻችን የፕሮጀክት ደረጃዎችን የማጣት እና ከተጠበቀውበላይ					

	ውጤቶችን የሚድረስ ችሎታችንን ያሻሽጉታል።					
25.	የተሳካው የፕሮጀክት ማጠናቀቂያ የቡድናችን ትጋት እና የትብብር ጥረቶች እንደ ምክር ሆነ ውያገ ለግላሉ።					