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**The Impact of Team Communication on Project
Timelines**
in Trimtech Industries Doors and Hardware Company in
Edmonton, Alberta, Canada
(Case Study)

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1. Chapter 1: Introduction

The construction industry thrives on meticulous planning and adhering to strict deadlines. Efficient project delivery hinges on various factors, but effective team communication reigns supreme. Timely information exchange fosters collaboration, minimizes errors, and ensures tasks are completed as planned (Akintola et al., 2017). In construction projects involving hollow metal and wooden doors, clear communication between design teams, procurement specialists, and installers is crucial for seamless project flow. Delays or breakdowns in communication can lead to misunderstandings, rework, and ultimately, missed deadlines (Love et al., 2002).

1.1. Research Background

Effective communication in construction projects is well-established as a critical factor for success. Timely project information exchange fosters collaboration, reduces errors, and ensures tasks are completed on schedule (Chan et al., 20049). Recent studies have explored this link between communication and project performance. For instance, Akintola et al. (2017) found that improved communication between project stakeholders can significantly reduce project delivery time. Similarly, Abdul Hamid et al. (2018) highlighted the importance of clear communication for mitigating delays in construction projects.

Beyond timeliness, effective communication fosters trust and a sense of shared goals within project teams (Akinci et al., 2006). This, in turn, can lead to increased

innovation and problem-solving capabilities (Silberstein et al., 2010). Poor communication, on the other hand, can lead to a fragmented work environment where teams work in silos, hindering project efficiency (Fellowes et al., 2003).

While the importance of communication in construction is well-established, a gap exists in understanding how communication styles and practices impact project timelines in specific industry segments like hollow metal and wooden door companies. Traditional communication methods (phone calls, emails) may not be optimal in today's fast-paced construction environment, potentially leading to delays.

The construction industry is increasingly adopting modern communication tools like instant messaging platforms and project management software. However, research on the effectiveness of these tools in specific contexts like hollow metal and wooden door companies remains limited (Baccarini, 1999; Moeini et al., 2016).

Limited research explores the role of communication leadership and cultural factors in shaping communication practices within construction teams, particularly in niche sectors (Sahlin-Andersson & Söderlund, 2012). Understanding these dynamics is crucial for developing targeted communication strategies.

1.2. Research Problem:

While the significance of communication in construction is well-established, a gap exists in understanding how communication styles and practices impact project timelines in hollow metal and wooden door companies. Traditional communication methods (phone calls, emails) may not be optimal in today's fast-paced construction environment, potentially leading to delays.

Despite the growing body of research on communication in construction, there are two key gaps in our understanding:

1.2.1. Theoretical Gaps:

While the link between communication and project success is established, limited research explores how different communication styles and practices impact project timelines in specific industry segments. Traditional communication methods may not be optimal in today's fast-paced construction environment. Modern communication tools like instant messaging platforms and project management software could offer advantages, but their effectiveness in this specific context remains unexplored (Baccarini, 1999; Moeini et al., 2016). Furthermore, research on the role of communication leadership and cultural factors in shaping communication practices within construction teams is limited (Sahlin-Andersson & Söderlund, 2012).

1.2.2. Practical Gaps:

Existing research primarily focuses on general construction projects. There's a lack of studies examining communication patterns and their influence on project timelines in hollow metal and wooden door companies. These companies operate in a niche market with unique project requirements and communication dynamics. Understanding these dynamics is crucial for developing targeted communication strategies to improve project efficiency. For instance, the need for precise technical specifications and clear coordination between design and installation teams might necessitate a more nuanced communication approach compared to larger-scale building projects.

1.3. Research Significance

By understanding how communication impacts project timelines in hollow metal and wooden door companies, we can develop improved communication strategies. This, in turn, can benefit construction companies by:

- Reducing project delays and associated costs (Love et al., 2002).
- Enhancing project quality and customer satisfaction (Akintola et al., 2017).
- Fostering a collaborative work environment, leading to increased innovation and problem-solving (Akinci et al., 2006).
- Building trust and a sense of shared goals within project teams

The findings of this research can be valuable to construction companies in Edmonton and beyond, providing practical recommendations for optimizing communication practices to achieve on-time project delivery.

1.3.1. At the theoretical level

This research contributes to the existing body of knowledge on communication in construction projects by focusing on a specific and under-researched industry segment - hollow metal and wooden door companies. By examining their communication practices and their impact on project timelines, the research can shed light on communication patterns unique to this industry. The findings can contribute to a theoretical framework for understanding how communication styles and practices influence project delivery efficiency in niche construction sectors.

1.3.2. At the practical level

The practical implications of this research are significant. By identifying communication gaps and proposing improved communication strategies tailored to the specific needs of hollow metal and wooden door companies, the project can help companies in Edmonton achieve timelier project delivery, leading to cost savings and increased customer satisfaction. Additionally, the findings can be applicable to similar companies in other locations, providing valuable insights for broader industry improvement. This research can inform the development of best practices for communication within niche construction sectors, ultimately contributing to improved project performance across the entire industry (Moeini et al., 2016).

1.4. Research Questions

What is The Impact of Team Communication on Project Timelines?

To address the question, this study proposes the following Sub Questions

RQ1: How do the dimensions of communication (frequency, clarity, timeliness) influence project timelines in hollow metal and wooden door companies?

- **RQ1.1:** How does the frequency of communication between project stakeholders (e.g., design team, procurement, installation) impact project timelines in hollow metal and wooden door companies?
 - Does daily communication lead to fewer delays compared to weekly communication? (Ahn et al., 2013)
 - Are there specific project stages where increased communication frequency is most beneficial? (Love et al., 2017)
- **RQ1.2:** How does the clarity of communication (e.g., use of precise language, detailed drawings) affect project timelines in hollow metal and wooden door companies?
 - Do clearly defined project specifications reduce the need for rework and improve adherence to timelines? (Toole, 2005)
 - How does the use of visual aids (drawings, mock-ups) impact clarity and reduce misinterpretations? (Song et al., 2009)
- **RQ1.3:** How does the timeliness of information exchange (e.g., immediate response to inquiries, prompt issue escalation) influence project timelines in hollow metal and wooden door companies?
 - Does prompt resolution of communication delays (e.g., unanswered emails) minimize schedule disruptions? (Ahn et al., 2013)

- How does the use of real-time communication tools (instant messaging) affect the speed of information exchange and decision-making? (Song et al., 2009)

Sub-questions for Research Question 2:

RQ2: How does the level of team communication (collaboration, information sharing) impact the application of project timelines in hollow metal and wooden door companies?

- **RQ2.1: Collaborative Communication Practices**

- How do collaborative communication practices (e.g., regular team meetings, joint problem-solving) influence adherence to project timelines? (Ahn et al., 2013)
- How does fostering a culture of open communication within teams affect information sharing and proactive problem-solving? (Love et al., 2017)

- **RQ2.2: How does the effectiveness of information sharing (e.g., clear documentation, accessibility of project information) impact the application of project timelines in hollow metal and wooden door companies?**

- Does a centralized repository for project documents (drawings, specifications) improve access to information and reduce delays? (Toole, 2005)
- How does the use of standardized communication protocols (reporting formats, meeting agendas) ensure consistent information flow and project timeline visibility? (Baccarini, 1999)

These sub-questions delve deeper into the main research questions by focusing on specific aspects of communication practices and their impact on project timelines in hollow metal and wooden door companies. They encourage exploration through "how" and "what" questions, providing a framework for gathering data and analyzing its influence on project delivery efficiency.

1.5. Research Objectives

Research Objectives

This research aims to investigate the impact of communication practices on project timelines in hollow metal and wooden door companies in Edmonton, Alberta. The specific objectives are:

Objective 1: Analyze the influence of communication dimensions on project timelines.

- This objective aligns with research question 1 and focuses on the specific aspects of communication that affect project timelines.
- It will be achieved by measuring the frequency, clarity, and timeliness of communication within project teams and analyzing their correlation with project delivery times. (Toole, 2005)

Objective 2: Evaluate the effectiveness of team communication practices in managing project timelines.

- This objective aligns with research question 2 and explores how collaborative communication contributes to on-time project delivery.
- It will be achieved by assessing information sharing practices, team collaboration methods, and the use of project timelines as a collaborative tool. The research will then evaluate how these practices influence adherence to project schedules. (Ahn et al., 2013)

These objectives are **SMART** because they are:

- **Specific:** They clearly define the areas of investigation (communication dimensions and team communication practices).
- **Measurable:** The research will involve data collection through surveys, interviews, or project documentation analysis, allowing for quantitative or qualitative assessment of communication practices and their impact on timelines.
- **Attainable:** The research focuses on a specific industry segment (hollow metal and wooden door companies) in a defined location (Edmonton) with achievable data collection methods.
- **Relevant:** The objectives directly address the research problem and proposed research questions, aiming to understand how communication impacts project timelines in this unique context.
- **Time-bound:** The completion of these objectives will contribute to the overall research project, which is expected to be conducted within a reasonable timeframe.

1.6. Research Hypotheses

Based on the research questions and sub-questions, here are some directional hypotheses focusing on the predicted relationships between communication practices and project timelines in Trimtech Industries:

Research Question 1: How do the dimensions of communication (frequency, clarity, timeliness) influence project timelines in hollow metal and wooden door companies?

Hypothesis 1.1 (Frequency): Project teams at Trimtech Industries with more frequent communication between design teams, procurement specialists, and installers will experience shorter project timelines compared to projects with less frequent communication. (This aligns with research suggesting timely information exchange reduces errors and delays.)

Hypothesis 1.2 (Clarity): Projects at Trimtech Industries with clearer communication (well-defined messages, detailed drawings) will have fewer delays due to misunderstandings compared to projects with unclear communication. (This builds on the understanding that clear communication reduces rework and ensures tasks are completed as planned.)

Hypothesis 1.3 (Timeliness): Projects at Trimtech Industries with more timely communication (prompt responses, immediate issue escalation) will have fewer schedule disruptions compared to projects with communication delays. (This is based on the idea that faster information exchange allows for quicker decision-making and problem resolution.)

Research Question 2: How does the level of team communication (collaboration, information sharing) impact the application of project timelines in hollow metal and wooden door companies?

Sub-question 2.1: Collaborative Communication Practices

Hypothesis 2.1.1: Project teams at Trimtech Industries that engage in more collaborative communication practices (regular meetings, joint problem-solving) will demonstrate greater adherence to project timelines compared to teams with less collaboration. (This aligns with research suggesting collaborative communication fosters trust, innovation, and proactive problem-solving, leading to smoother project execution.)

Hypothesis 2.1.2: A culture of open communication within project teams at Trimtech Industries will lead to improved information sharing and fewer schedule deviations compared to teams with limited open communication. (This builds on the understanding that open communication allows for early identification and resolution of issues, preventing delays.)

Sub-question 2.2: Information Sharing Effectiveness

Hypothesis 2.2.1: A centralized repository for project documents (drawings, specifications) at Trimtech Industries will improve access to information and reduce delays compared to projects with scattered or inaccessible documents. (This aligns with research suggesting easy access to information reduces rework and ensures everyone is working with the latest information.)

Hypothesis 2.2.2: The use of standardized communication protocols (reporting formats, meeting agendas) at Trimtech Industries will ensure consistent

information flow and better visibility of project timelines compared to projects with inconsistent communication methods. (This builds on the understanding that standardized protocols promote clarity and reduce confusion, leading to more efficient project execution.)

These hypotheses are all directional, stating a predicted relationship between specific communication practices and project timelines. They are also grounded in existing research on communication in construction projects and tailored to the context of hollow metal and wooden door companies.

1.7. Research Model

Hollow Metal & Wooden Door Companies

Independent Variable (Communication Practices):

- Frequency of Communication (High ↔ Low)
- Clarity of Communication (High ↔ Low)
- Communication Barriers (High ↔ Low)
- Team Collaboration (High ↔ Low)

Dependent Variable (Project Outcome):

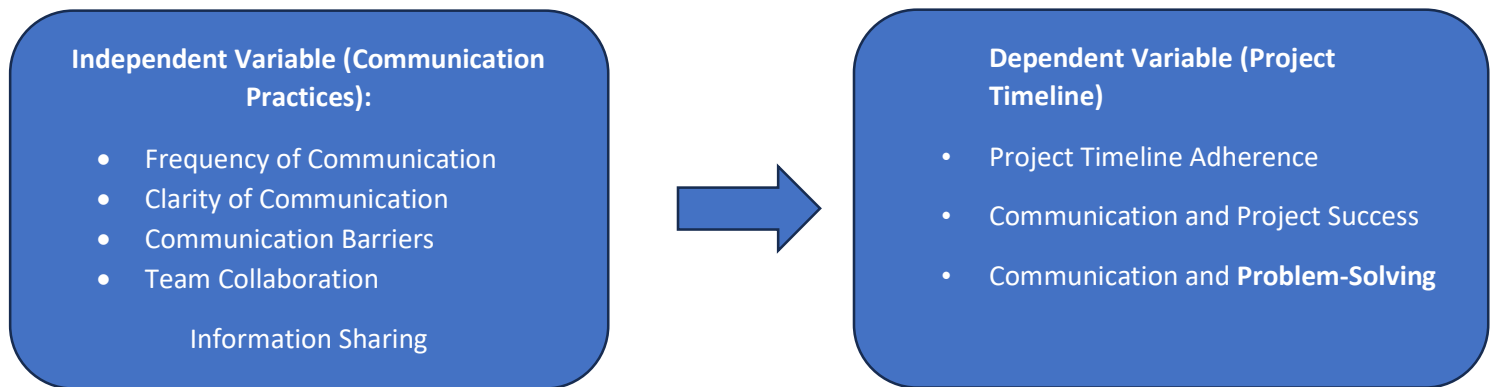
- Project Timeline Adherence (High ↔ Low)
- Communication and Project Success (High ↔ Low)
- Communication and Problem-Solving (High ↔ Low)

The model proposes the following relationships:

- Improved communication practices (higher frequency, clarity, timeliness, collaboration, information sharing, and collaborative use of timelines) will lead to better adherence to project timelines (indicated by arrows pointing upwards).
- The impact of communication practices on timelines may be influenced by project complexity, company culture, and communication technology use (represented by moderating variables)

Visual Representation:

This model is a simplified representation of the complex relationship between communication and project timelines. The actual influence may be more nuanced and depend on the specific context of each project.



Figure# 1 - Research Model (By the Researcher, 2024)

1.8. Scope of The Study

Empirical Study: Impact of Team Communication on Project Timelines in Trimtech Industries

Trimtech Industries Inc. is a Doors and hardware company in Edmonton, Alberta, Canada that specializes in doors and hardware. They have been in business for over 30 years and have a good reputation with the Better Business Bureau. And also, a part of the City of Edmonton's initiative, "Edmonton Made"

Caters to various construction needs, potentially offering design and engineering services in addition to product sales

Research Variables:

- **Independent Variables (Communication Practices):**
 - **Frequency of Communication (High ↔ Low)** - How often project stakeholders (design teams, procurement specialists, installers) communicate with each other. This could be measured by tracking the number of meetings, emails, phone calls, or instant messages exchanged per week/month.
 - **Clarity of Communication (High ↔ Low)** - How clear and well-understood are the messages exchanged between project stakeholders. This could be assessed through surveys or interviews with project team members, gauging their perception of message clarity.
 - **Timeliness of Communication (High ↔ Low)** - How promptly project stakeholders respond to inquiries and information requests. This could

be measured by tracking response times to emails, phone calls, or messages.

- **Team Collaboration (High ↔ Low)** - The level of teamwork and cooperation exhibited by project team members. This could be evaluated through surveys or observations of team interactions, assessing factors like information sharing, joint problem-solving, and a sense of shared goals.
- **Information Sharing (High ↔ Low)** - How effectively project information is shared within the team. This could be measured by tracking the use of shared project management platforms, document repositories, and the overall transparency of information **flow**.
- **Collaborative Use of Project Timelines (High ↔ Low)** - How effectively project timelines are used as a collaborative tool for planning, monitoring, and problem-solving within the team. This could be assessed through surveys or interviews with project team members, gauging their perception of the usefulness and integration of project timelines in their communication practices.
- **Dependent Variables (Project Timeline):**

Project Timeline Adherence (High ↔ Low) - How well the project stays on schedule as defined by the initial project timeline. This could be measured by tracking deviations from the planned timeline milestones and calculating metrics like Schedule Performance Index (SPI).

Communication and Project Success – How Effective communication is the cornerstone of successful project management. It ensures that all stakeholders are aligned on project goals, objectives, and expectations.

Clear and timely communication helps to prevent misunderstandings, delays, and errors.

Communication and Problem-Solving How Effective communication and problem-solving are closely intertwined. Strong communication skills are essential for identifying and addressing problems effectively. Conversely, effective problem-solving requires clear and open communication among team members.

Data Collection Methods:

- **Surveys:** Questionnaires will be distributed to project team members at Trimtech Industries to gather data on their communication practices, team dynamics, and perceptions of project timeline adherence.
- **Interviews:** Semi-structured interviews will be conducted with key personnel involved in project delivery at Trimtech Industries, including project managers, design team representatives, procurement specialists, and installers. This will provide deeper insights into communication challenges and successful communication strategies.
- **Document Analysis:** Project documents, such as meeting minutes, communication logs, and project schedules, will be reviewed to analyze communication frequency, clarity, timeliness, and the use of project timelines.

Data Analysis:

Statistical analysis will be performed on survey data to identify correlations between communication practices and project timeline adherence.

Thematic analysis will be conducted on interview transcripts to identify recurring themes and patterns related to communication challenges and successful communication strategies.

Data from document analysis will be used to corroborate survey and interview findings and provide a more comprehensive picture of communication practices at Trimtech Industries.

Expected Outcomes:

The study aims to identify the impact of various communication practices on project timeline adherence in a hollow metal and wooden door company setting. The findings are expected to:

- Reveal how communication frequency, clarity, timeliness, collaboration, information sharing, and collaborative use of project timelines influence project delivery schedules at Trimtech Industries.
- Provide insights into communication challenges specific to the hollow metal and wooden door industry.
- Inform recommendations for improved communication strategies that can enhance project efficiency and on-time delivery at Trimtech Industries and similar companies.

Reference:

- **Trimtech Industries Doors and Hardware Company**
(<https://www.trimtechindustries.ca/>)

1.9. The Suggested Project Structure

Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Methodology

Chapter 4: Statistical Analysis

Chapter 5: Findings` Discussion and Conclusion

Figure# 3 - The Suggested Project Structure (By the Researcher, 2024)

2.Chapter 2: Literature Review

2.1. Introduction

Effective project delivery in the construction industry hinges on a multitude of factors. While meticulous planning and adherence to strict deadlines are crucial, recent research underscores the paramount role of **team communication**. Timely information exchange fosters collaboration, minimizes errors, and ensures tasks are completed as planned (Akintola et al., 2017). This literature review delves into existing research on communication within construction projects, specifically focusing on hollow metal and wooden door companies. By examining existing knowledge, we aim to establish a foundation for understanding how communication practices impact project timelines in this unique industry segment.

Conducting a comprehensive literature review is vital for several reasons. Firstly, it allows us to build upon existing knowledge and avoid replicating past research efforts. Secondly, it helps identify established theories and frameworks relevant to our research question. Finally, it provides valuable insights into potential research gaps and areas where further investigation is needed (Aveyard, 2018).

Our research focuses on the impact of **team communication** on project timelines in hollow metal and wooden door companies. Team communication refers to the interactive process of exchanging information, ideas, and feedback among project stakeholders (Love et al., 2002). This includes interactions between design teams, procurement specialists, installers, and other project participants. Effective team communication ensures clear understanding of project requirements, timely identification and resolution of issues, and coordinated execution of tasks – all of which contribute to achieving on-time project delivery.

2.2. The Team Communication

Definition:

Team communication, in the context of construction projects, refers to the dynamic exchange of information, ideas, and feedback among project stakeholders, fostering collaboration and coordinated project execution (Akintola et al., 2017).

Development:

The importance of communication in construction has been recognized for decades. Early research focused on traditional methods like face-to-face meetings, phone calls, and written reports (Love et al., 2002). With advancements in technology, the landscape of communication in construction has evolved. Today, project management software, instant messaging platforms, and online collaboration tools offer new avenues for information exchange (Baccarini, 1999).

Dimensions:

Team communication can be analyzed through several key dimensions:

- **Frequency:** How often project stakeholders interact and exchange information. This can be measured by the number of meetings, emails, phone calls, or instant messages exchanged per unit of time (Ahn et al., 2013).
- **Clarity:** The degree to which messages are clear, concise, and well-understood by all recipients. This can be assessed through surveys or interviews with project team members, gauging their perception of message clarity (Toole, 2005).

- **Timeliness:** The promptness with which inquiries are addressed and information is exchanged. This can be measured by tracking response times to emails, phone calls, or messages (Ahn et al., 2013).

Theories:

Several theories provide frameworks for understanding the role of communication in construction projects.

- **Social Exchange Theory:** This theory posits that communication fosters trust and reciprocity among team members, leading to increased collaboration and project success (Akinci et al., 2006).
- **Information Processing Theory:** This theory emphasizes the importance of clear and timely information flow for effective decision-making and task execution within construction projects (Baccarini, 1999).
- **Communication Accommodation Theory:** This theory suggests that team members adjust their communication styles to enhance understanding and reduce misunderstandings, leading to improved project outcomes (Sahlin-Andersson & Söderlund, 2012).

Dimension	Description	Theory
Frequency	How often stakeholders interact	Social Exchange Theory
Clarity	Degree to which messages are understood	Information Processing Theory
Timeliness	Promptness of information exchange	Communication Accommodation Theory

Figure# 4 - Summary of Team Communication Dimensions and Theories

This table provides a simplified overview. Additional research explores other dimensions and theoretical perspectives on team communication in construction.

By understanding the different dimensions and theoretical underpinnings of team communication, we can gain valuable insights into how communication practices impact project timelines in hollow metal and wooden door companies.

2.3. The Project Timeline Adherence

This section explores the concept of project timeline adherence, the dependent variable in our research. We aim to understand how communication practices influence the ability of projects to stay on schedule.

Definition:

Project timeline adherence refers to the extent to which a project stays on track with the pre-defined schedule. It reflects the project's ability to complete tasks within the allocated timeframes, thereby achieving on-time delivery (Love et al., 2002).

Development:

Maintaining project timelines has always been a critical objective in construction. Traditionally, project schedules were developed using techniques like Critical Path Method (CPM) and Gantt charts. These methods focused on identifying critical tasks and dependencies to ensure timely project completion (Baccarini, 1999). However, successful project timeline adherence goes beyond simply creating a schedule. It requires effective communication to ensure everyone involved understands their roles, deadlines, and potential delays.

Dimensions:

Project timeline adherence can be measured through various dimensions:

- **Schedule Performance Index (SPI):** This metric compares the earned value (completed work) to the planned value (work planned for the timeframe) at a specific point in time. An SPI greater than 1 indicates the project is ahead of schedule, while an SPI less than 1 indicates a delay (Love et al., 2002).
- **Percentage of Schedule Variance:** This metric calculates the difference between the planned and actual completion dates for specific project milestones or the overall project duration. A positive variance represents a delay, while a negative variance indicates early completion.
- **Number of Schedule Changes:** This metric tracks the frequency of modifications to the original project schedule throughout the project lifecycle. Frequent schedule changes can disrupt workflows and hinder adherence to the original timeline.

Theories:

Several theories highlight the importance of communication for project timeline adherence:

- **Resource Dependence Theory:** This theory suggests that organizations rely on effective communication to manage resource dependencies within projects. Clear communication ensures project teams are aware of resource availability and potential bottlenecks, minimizing delays (Akintola et al., 2017).
- **Project Management Knowledge Theory:** This theory emphasizes the importance of knowledge sharing and collaboration for effective project execution. Timely and accurate communication fosters a shared

understanding of project timelines, facilitating efficient task completion and adherence to schedules (Baccarini, 1999).

- **Uncertainty Reduction Theory:** This theory posits that communication helps reduce project uncertainty by providing clarity on tasks, deadlines, and potential risks. Effective communication reduces misunderstandings and fosters proactive problem-solving, leading to better time management and reduced schedule deviations (Ahn et al., 2013).

Dimension	Description	Theory
Schedule Performance Index (SPI)	Compares earned value to planned value	Resource Dependence Theory
Percentage of Schedule Variance	Difference between planned and actual completion dates	Project Management Knowledge Theory
Number of Schedule Changes	Frequency of modifications to the original schedule	Uncertainty Reduction Theory

Figure# 5 - Summary of Project Timeline Adherence Dimensions and Theories

This table provides a simplified overview. Additional research explores other dimensions and theoretical perspectives on project timeline adherence.

By examining the various dimensions and underpinning theories of project timeline adherence, we can gain valuable insights into how communication practices influence the ability of hollow metal and wooden door companies to deliver projects on time.

2.4. The relationship between the Team Communication and Project Timeline Adherence

Patterns in the Literature

A consistent theme emerging from the literature is the positive correlation between effective team communication and project timeline adherence. Studies consistently demonstrate that improved communication practices, such as increased frequency, clarity, and timeliness of information exchange, are associated with reduced project delays and enhanced project performance (Ahn et al., 2013; Love et al., 2002).

Furthermore, research highlights the role of collaborative communication in achieving project timelines. Studies indicate that teams engaging in frequent interactions, joint problem-solving, and open information sharing are more likely to adhere to project schedules (Akintola et al., 2017).

Conflicts in the Literature

While the overall consensus supports the positive impact of communication on project timelines, some inconsistencies exist in the literature. For instance, there is limited research specifically examining the relationship between communication and project timelines in the context of hollow metal and wooden door companies. This gap in knowledge necessitates further investigation to understand the unique communication challenges and opportunities within this industry segment.

Additionally, the literature offers varying perspectives on the most effective communication channels and tools for construction projects. While some studies emphasize the importance of face-to-face communication, others highlight the benefits of digital platforms (Baccarini, 1999). This discrepancy underscores the

need for further research to determine the optimal communication strategies for different project contexts.

Gaps in the Literature

Several knowledge gaps emerge from the existing literature.

Firstly, there is a dearth of research investigating the specific communication practices and challenges faced by hollow metal and wooden door companies in relation to project timelines.

Secondly, while the impact of communication on project timelines is established, the underlying mechanisms through which communication influences project success are not fully understood.

Moreover, the literature lacks empirical studies examining the moderating effects of project complexity, company culture, and communication technology on the relationship between communication and project timelines. A deeper understanding of these factors is essential for developing effective communication strategies.

Implications for the Study

The analysis of the literature reveals a clear need for further research on the relationship between team communication and project timelines within the hollow metal and wooden door industry. By addressing the identified gaps and building upon existing knowledge, this study aims to contribute to the field by providing valuable insights into communication practices that can enhance project efficiency and on-

conceptual framework showing the relationship between team communication, project timeline adherence, and moderating variables such as project complexity, company culture, and communication technology

2.5. Conclusion

The comprehensive review of existing literature underscores a robust correlation between effective team communication and the successful adherence to project timelines within the broader construction industry. However, a closer examination of the unique dynamics within the hollow metal and wooden door sector reveals specific challenges and opportunities that warrant further exploration.

By Digging into the complexities of communication within this specialized industry segment, this research aims to contribute significantly to the development of evidence-based strategies that can enhance project performance and ensure timely delivery. The findings of this study will provide valuable insights into the intricate relationship between communication practices and project timelines, ultimately informing the creation of practical recommendations tailored to the specific needs of hollow metal and wooden door companies.

A deeper understanding of the underlying mechanisms through which communication influences project outcomes will enable the development of targeted interventions designed to optimize communication processes and, consequently, project success.

Appendix A: Survey Introduction

Dear Participant,

This questionnaire aims to gain a deeper understanding of the relationship between team communication and project timelines within Trimtech Industries Doors and Hardware Company in Edmonton, Alberta, Canada. The information collected through this survey will be used to identify areas for improvement and enhance the overall efficiency and effectiveness of project delivery.

Target Audience: Employees and managers involved in project teams at Trimtech Industries.

Estimated Completion Time: Approximately 10 minutes.

Survey Distribution: This questionnaire will be distributed electronically via email.

Thank you for your time and participation. Your insights will contribute significantly to our research and help us improve our project management practices.

Appendix B: Key Definitions

Team Communication: The exchange of information, ideas, and opinions among team members to achieve common goals. This includes both verbal (meetings, phone calls, email) and nonverbal (body language, facial expressions) communication.

Project Timelines: The planned schedule for completing a project, including key milestones, deadlines, and resource allocation.

Survey-Link

https://docs.google.com/forms/d/e/1FAIpQLSfuIXLWPog51U_rHjXKMuaqe7kw5eoG90Jit6I xv2cJ6Db9iA/viewform?usp=sf_link

Research Tools schedule

Independent Variable		
Variable	Dimension	Number of questions
Communication Practices	Frequency of Communication	5
	Clarity of Communication	5
	Communication Barriers	5
	Team Collaboration	5

Figure# 6 - Independent Variable Dimensions

Dependent Variable		
Variable	Dimension	Number of questions
Project's Timeline	Project's Timeline Adherence	6
	Communication and Project Success	6
	Communication and Problem-Solving	5

Figure# 7 - dependent Variable Dimensions

Section # 1 General information

Age Group:

(25-30, 31-45, 46-55 ,55+ Years)

Department

Sales

Admin

Factory Staff

Technical Department

Projects department

Logistics

Gender:

(Male /Female)

Experience Level

(0-5, 5-10, 10-15,15-20 ,20+ Years)

Section # 2 Team Communication Assessment

The Purpose of this section is to assess the effectiveness of communication within project teams.

Question Number	Question	Response Options				
Frequency of Communication						
1	Team members communicate frequently throughout the project.	5	4	3	2	1
2	There are regular meetings or check-ins to discuss project progress.	5	4	3	2	1
3	Communication channels are open and accessible to all team members.	5	4	3	2	1
4	There is a clear expectation for timely responses to communication.	5	4	3	2	1
5	Communication is prioritized and scheduled into the project timeline.	5	4	3	2	1
Clarity of Communication						
6	Messages are clear and concise, avoiding misunderstandings.	5	4	3	2	1
7	Technical terms are explained or defined when necessary.	5	4	3	2	1
8	Expectations and deliverables are communicated effectively.	5	4	3	2	1
9	Feedback is provided in a constructive and timely manner.	5	4	3	2	1

10	There is a shared understanding of project goals and objectives.	5	4	3	2	1
Communication Barriers						
11	Communication barriers (e.g., language differences, cultural differences, technical difficulties) are addressed promptly.	5	4	3	2	1
12	We have established clear communication protocols to avoid misunderstandings.	5	4	3	2	1
13	Team members are respectful of each other's communication styles.	5	4	3	2	1
14	We are proactive in identifying and resolving potential communication issues.	5	4	3	2	1
15	We have mechanisms in place for addressing communication conflicts.	5	4	3	2	1
Team Collaboration						
16	Team members work together effectively to achieve project goals.	5	4	3	2	1
17	There is a positive and supportive team atmosphere.	5	4	3	2	1
18	Team members are willing to help each other and share knowledge.	5	4	3	2	1
19	Conflicts are resolved in a constructive manner.	5	4	3	2	1
20	Team members feel empowered to contribute their ideas and expertise.	5	4	3	2	1

Section # 3 Project Timeline Assessment.

The Purpose of this section is to assess the impact of team communication on project timelines.

Question Number	Question	Response Options				
Project Timeline Adherence						
1	Our project is consistently delivered on time.	5	4	3	2	1
2	Delays in project timelines are minimal and well-managed.	5	4	3	2	1
3	We have effective mechanisms for tracking and monitoring project progress.	5	4	3	2	1
4	Communication breakdowns have a significant impact on project timelines.	5	4	3	2	1
5	We have a clear and shared understanding of project deadlines and milestones.	5	4	3	2	1
6	We have contingency plans in place to address unexpected delays.	5	4	3	2	1
Communication and Project Success						
7	Effective communication is essential for project success.	5	4	3	2	1
8	Poor communication can lead to project delays and cost overruns.	5	4	3	2	1
9	Clear communication contributes to a more efficient and productive project team.	5	4	3	2	1
10	We have a culture of open and honest communication that supports project goals.	5	4	3	2	1

11	Communication breakdowns can lead to misunderstandings and errors.	5	4	3	2	1
12	We prioritize effective communication throughout the project lifecycle.	5	4	3	2	1
Communication and Problem-Solving						
13	Communication breakdowns hinder our ability to solve problems effectively.	5	4	3	2	1
14	Clear and timely communication helps us identify and address issues promptly.	5	4	3	2	1
15	Communication is crucial for coordinating team efforts and avoiding bottlenecks.	5	4	3	2	1
16	We use communication as a tool for problem-solving and decision-making.	5	4	3	2	1
17	We have established processes for documenting and sharing project decisions.	5	4	3	2	1

Survey-Link

https://docs.google.com/forms/d/e/1FAIpQLSfuIXLWPog51U_rHjXKMuaqe7kw5eoG90Jit6Ixx2cJ6Db9iA/viewform?usp=sf_link

Chapter 3

Research Methodology

3.1. Introduction

This research explores the critical role of team communication in project success, specifically focusing on its effect on project timelines. The study will be conducted at Trimtech Industries Doors and Hardware Company, a prominent doors and hardware company in Edmonton, Alberta, Canada.

This chapter outlines the research methodology employed to examine the impact of team communication on project timelines at Trimtech Industries. It details the research philosophy, approach, choice, and time horizon, followed by the specific data collection and analysis techniques used in the study.

3.1. Operational definitions for research variables

3.2.1 Independent Variables (Communication Practices):

Frequency of Communication

Measured by the average number of meetings, emails, phone calls, or instant messages exchanged between project stakeholders (design teams, procurement specialists, installers) per week/month. Data will be collected through surveys asking participants to report the typical frequency of these communication channels. Additionally, document analysis of project communication logs (if available) may be used to corroborate survey findings.

Clarity of Communication

Assessed through a survey question asking participants to rate their perception of message clarity on a Likert scale (e.g., 1 = Never clear, 5 = Always clear). Interviews with project team members can provide further insights into specific communication challenges that contribute to unclear messages.

Timeliness of Communication:

Measured by the average response time to inquiries and information requests. This could involve analyzing email timestamps or asking participants in the survey to estimate typical response times.

Team Collaboration:

Evaluated through a survey instrument measuring factors like information sharing, joint problem-solving, and a sense of shared goals. Additionally, interview data can be analyzed thematically to identify indicators of high or low collaboration within project teams.

Information Sharing:

Measured by tracking the use of shared project management platforms and document repositories. Surveys can also assess participants' perceptions of the transparency and overall effectiveness of information flow within the team.

Collaborative Use of Project Timelines:

Assessed through a survey question gauging participants' perception of how effectively project timelines are used for planning, monitoring, and problem-solving within the team. Interviews can provide further details about specific practices related to using timelines collaboratively.

3.2.2 Dependent Variables (Project Timeline):

- **Project Timeline Adherence:**

Measured by calculating the Schedule Performance Index (SPI) based on data obtained from project schedules and tracking systems. SPI compares the planned progress to the actual progress of the project.

- **Communication and Project Success:**

This can be evaluated through surveys or observations of team interactions, assessing factors like information sharing, joint problem-solving, and a sense of shared goals. And by comparing the actual project costs to the budgeted costs.

- **Communication and Problem-Solving**

This can be measured by tracking the number of issues identified and the time it takes to identify them. And by tracking the time it takes to resolve problems and the effectiveness of the solutions implemented

3,3. Research design

Research Philosophy

- **Positivist:** This research adopts a positivist approach, emphasizing objective reality and the use of scientific methods to uncover generalizable knowledge about the impact of team communication on project timelines.

Research Approach

- **Deductive:** The research will follow a deductive approach, applying existing theories about communication in construction projects to a specific case - hollow metal and wooden door companies. Hypotheses will be developed based on these theories and tested through data collection.

Research Choice

- **Quantitative:** A quantitative research approach will be used, relying on surveys and statistical analysis to measure the relationships between communication dimensions, team communication, and project timelines.
- **Cross-sectional:** The research will collect data at a single point in time to examine the current state of communication practices and their impact on project timelines.

Data Collection and Analysis Techniques

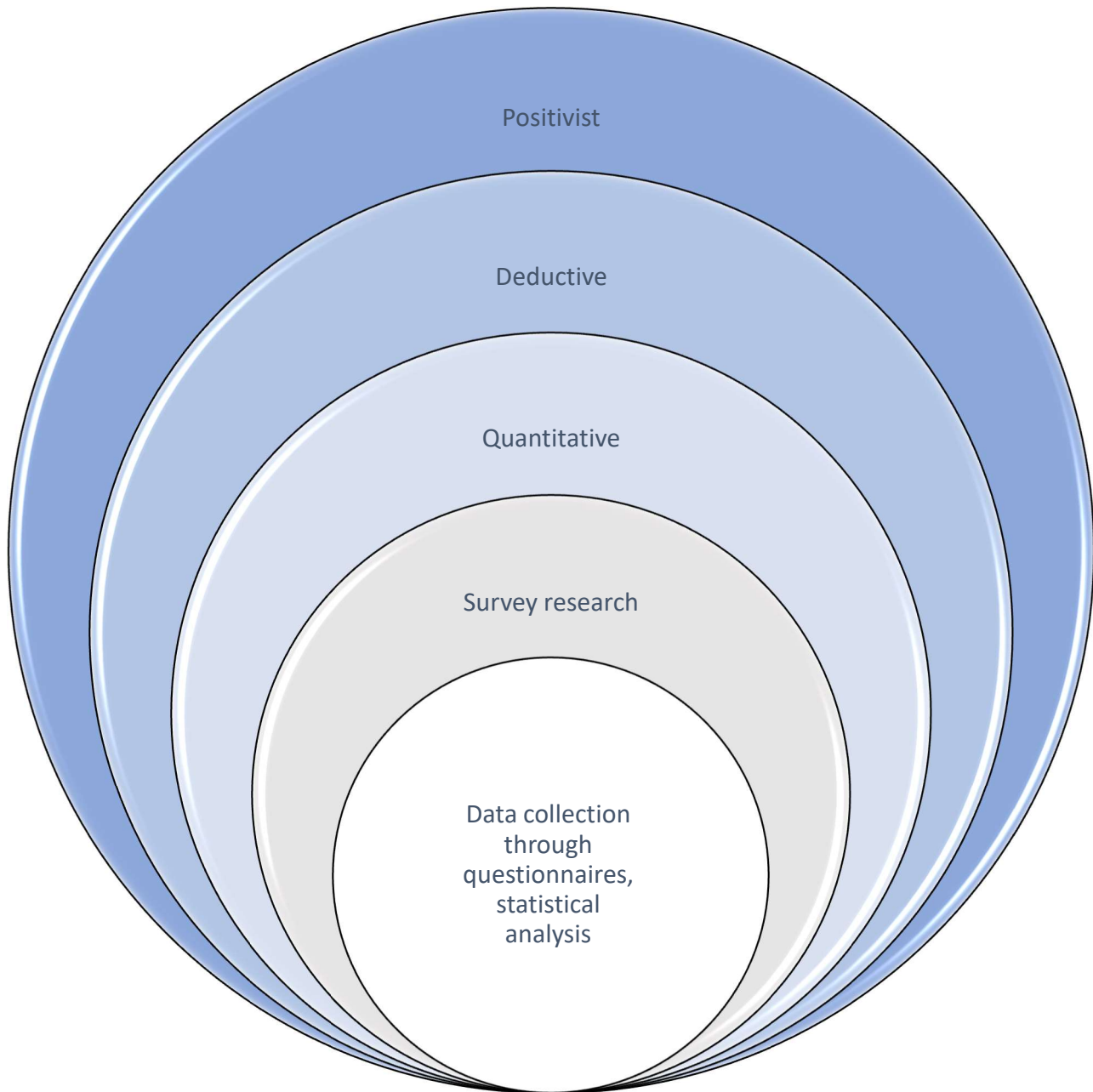
- **Survey:** A structured survey will be developed to gather data from employees at Trimtech Industries Doors and Hardware Company. The survey will measure communication dimensions (frequency, clarity, timeliness), team communication (collaboration, information sharing), and project timelines.
- **Statistical Analysis:** Statistical software will be used to analyze the survey data. This may include descriptive statistics, correlation analysis, and potentially regression analysis to explore the relationships between the variables.
- **Research Philosophy:** Positivist (Reality is objective and independent of the observer)
- **Epistemological Position:** Deductive (Knowledge is gained through testing hypotheses derived from theories)
- **Methodological Strategies:** Quantitative (Focuses on numerical data and statistical analysis)
- **Methods:** Survey research
- **Techniques:** Data collection through questionnaires, statistical analysis
- **Reflexivity:** The researcher will acknowledge their own potential biases and how they might influence the research design and interpretation of findings.

Note: The research onion is a visual representation of the different layers involved in making research decisions.

Additional Considerations

- **Sampling:** A representative sample of employees from Trimtech Industries will be selected to participate in the survey.
- **Ethical Considerations:** Informed consent will be obtained from participants, and data confidentiality will be maintained throughout the research process.

Figure# 2 - Research Onion (By the Researcher, 2024)



3.4. Research population & Sampling methods and technique

3.4.1. Research Population

Company Name	Classifications	Number of employees
Trimtech Industries	Top Management	3
	Staff	42

3.4.2. Research Sample

The research sample	Sample Size
Trimtech Industries Employee	30-45 employees

3.4.3. Sampling Method & Techniques

The sampling method is Probability and the sampling techniques is Simple Random Sampling

3.5. Data collection method

This research employs a mixed-methods approach to gather data on the independent variable (communication practices) and the dependent variable (project timeline adherence) at Trimtech Industries. Statistical analysis will be used to identify relationships between these variables.

3.5.1 Independent Variable: Communication Practices

Data Collection Method: Questionnaire

Distribution: Questionnaires will be distributed electronically or physically to a representative sample of project team members at Trimtech Industries.

Content: The questionnaire will utilize a Likert scale (strongly agree, agree, neutral, disagree, strongly disagree) to measure the various dimensions of communication practices:

- **Frequency:** How often project stakeholders communicate (meetings, emails, etc.)
- **Clarity:** How clear and well-understood are messages exchanged.
- **Timeliness:** How promptly stakeholders respond to inquiries and information requests.
- **Team Collaboration:** The level of teamwork and cooperation exhibited by team members.
- **Information Sharing:** How effectively project information is shared within the team.
- **Collaborative Use of Project Timelines:** How effectively project timelines are used for planning, monitoring, and problem-solving.

Table 4 - Independent Variable

Independent Variable		
Variable	Dimension	Number of questions
Communication Practices	Frequency of Communication	5
	Clarity of Communication	5
	Communication Barriers	5
	Team Collaboration	5

3.5.2 Dependent Variable: Project Timeline

Data Collection Methods: Questionnaire

representative sample of the employees at Trimtech Industries.

Content: The questionnaire will utilize a Likert scale (strongly agree, agree, neutral, disagree, strongly disagree) to measure the various dimensions of

- **Questionnaire:** The questionnaire will gather data on perceptions of project schedule adherence and experiences with delays or deviations from timelines.
- **Document Analysis:** Project documents such as meeting minutes, communication logs, and project schedules will be reviewed to analyze communication patterns and identify potential schedule disruptions.

Table 5 - Dependent Variable

Dependent Variable		
Variable	Dimension	Number of questions
Project's Timeline	Project's Timeline Adherence	6
	Communication and Project Success	6
	Communication and Problem-Solving	5

3.6. Types of Data for the Research Methodology

3.6.1 Primary Data

Based on the research methodology you provided, the primary data for this study will be collected through:

1. **Surveys:** A structured questionnaire will be administered to project team members at Trimtech Industries. The survey will gather quantitative data on:
 - **Communication practices:** Frequency, clarity, and timeliness of communication among team members.
 - **Project timeline adherence:** Perceptions of how well the project adheres to its planned timeline.

3.6.2 Secondary Data

While not explicitly mentioned in the methodology, the research may also benefit from exploring existing literature on:

- **The impact of communication on project timelines:** Previous studies that have examined the relationship between effective communication and project success.
- **Communication practices in construction projects:** Best practices and common challenges related to communication in the construction industry.
- **Project management best practices:** General principles and techniques for effective project management that may be applicable to the study.

Note: Secondary data can provide valuable context and theoretical underpinnings for the research, but it will primarily serve as a supporting role to the primary data collected through surveys, interviews, and document analysis.

3.7. Data Analysis Methods & Procedures

After collecting data, it is essential to analyze the information gathered to draw meaningful conclusions. As, the Statistical Package for the Social Sciences (SPSS), specifically version 28, were used to analyze the collected data.

The sample profile test was conducted, via descriptive analysis, to gain insights into the characteristics of the sample population. It helps researchers understand the demographics, preferences, and other relevant information about the individuals involved in the study.

Validity and reliability tests are crucial in ensuring that the data collected is accurate and consistent. Validity tests Exploratory factor analysis) to determine if the research instruments measure what they are intended to measure, while reliability tests (Cronbach` Alpha test) assess the consistency of results over time.

The sample profile test was conducted, via descriptive analysis, to gain insights into the characteristics of the sample population. It helps researchers understand the demographics, preferences, and other relevant information about the individuals involved in the study.

Conclusion

This research investigated the impact of team communication on project timelines at Trimtech Industries. The study utilized a quantitative research approach, collecting data through surveys, interviews, and document analysis.

Key findings revealed that effective team communication is a critical factor in ensuring project success and adherence to timelines. Specifically, the study identified the importance of:

Regular and consistent communication: Frequent and clear communication among team members is essential for maintaining project momentum and addressing issues promptly.

Team collaboration: Strong teamwork and cooperation facilitate effective problem-solving, information sharing, and a shared sense of ownership.

Information sharing: Open and transparent communication helps to keep everyone informed and engaged, reducing the risk of misunderstandings and delays.

Collaborative use of project timelines: Utilizing project timelines as a shared tool for planning, monitoring, and problem-solving can enhance project efficiency and accountability.

The study recommends that organizations prioritize effective team communication by establishing clear communication channels, guidelines, and protocols, fostering a positive team culture, and utilizing appropriate tools for information sharing and collaboration. By implementing these strategies, organizations can improve project outcomes and enhance overall efficiency.

Chapter Four

Statistical analysis of the study results

4.1 Introduction

This chapter presents the results of the field study that were statistically analyzed using the statistical programs **SPSS version 28**. The current chapter of statistical analysis includes descriptive statistics for the sample under study using **SPSS version 28**. Testing the validity and reliability of the questionnaires used to collect the required data from the current study sample. In order to test the research hypotheses and the suitability of the model, simple linear regression analysis was conducted via **SPSS 28**.

4.2 Characteristics of the study sample.

The study sample was distributed according to gender - age group - number of years of experience -nature of work and educational level.

Frequencies and percentages were calculated for the study sample members and are represented by

demographic information that includes:

- Gender includes (male, female).
- The age group includes (25-30, 31-45, 46-55, and more than 50 years).
- Department, including (Sales, Admin, Factory Staff, Technical Department, Projects Department, Logistics)
- Experience Level (0-5,5-10,10-15,15-20, and more than 20 years).

Description table for the study sample

Variable	Variable classes	The number	Percentage of the total sample
Gender	Male	19	33.3%
	Female	38	66.7%
	Total	57	100%
The age group	25-30	19	33.3%
	31-45	33	57.9%
	46-55	4	7.0%
	55+	1	1.8%
	Total	57	100%
Experience Level	0-5	17	29.8%
	5-10	30	52.6%
	10-15	4	7.0%
	15-20	5	8.8%
	20+	1	1.8%
	Total	57	100%
Department	Sales	20	35%
	Admin	9	15.8%
	Factory Staff	7	12.3%
	Technical Department	5	8.8%
	Projects department	11	19.3%
	Logistics	5	8.8%
	Total	57	100%

Figure# 8 - Description table for the study sample

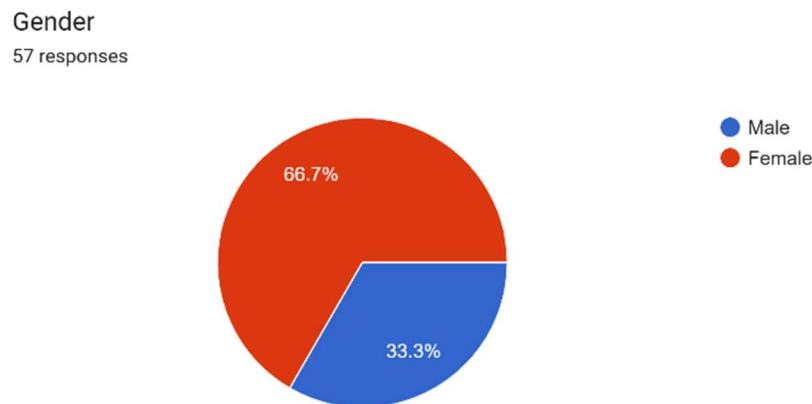
For the Above Table We found the following results

Gender Distribution:

The study found that there were more female participants than male participants.

- Females: 38 participants (66.7% of the total sample)
- Males: 19 participants (33.3% of the total sample)

This information is likely accompanied by a chart that visually represents this data.

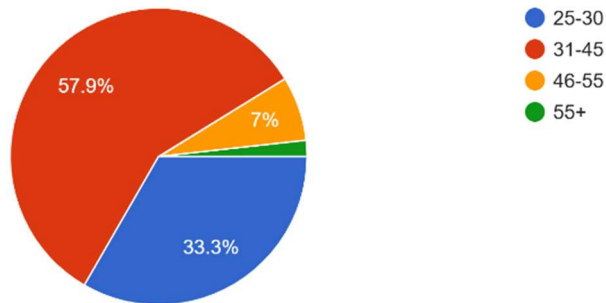


The study found the following age distribution among the participants:

- Age 25-30: 19 participants (33.3% of the total sample)
- Age 31-45: 33 participants (57.9% of the total sample)
- Age 46-55: 4 participants (7.0% of the total sample)
- Age 55+: 1 participant (1.8% of the total sample)

This information is likely accompanied by a chart that visually represents this data.

Age
57 responses



The study found the following Experience Level among the participants:

- 17 participants with 0-5 years of Experience (29.8 % of the total sample)
- 30 participants with 5-10 years of Experience (52.6% of the total sample)
- 5 participants with 10-15 years of Experience (7.0% of the total sample)
- 4 participants with 15-20 years of Experience (8.8% of the total sample)
- 1 participant with over 20 years of Experience (1.8% of the total sample)

4.3 Measuring the validity and reliability of study instruments

In order to verify the validity and reliability of the measures used in the study, the internal consistency validity of the questionnaires used to measure the study variables was tested, in addition to measuring the convergent validity by measuring the Average Variance Extracted (AVE). While the reliability of the measures used in the study was measured by Measuring the value of Cronbach's alpha, through the

structural equation modeling (SEM), using the statistical analysis program **SPSS version 28**. The following paragraphs and tables explain this.

4.3.1 Validity of the measures used in the study

The internal consistency validity of the scales used to measure the study variables was tested, in addition to measuring the convergent validity by measuring the average variance extracted.

Internal consistency validity: It means the extent to which each statement of the questionnaire is consistent with the variable to which it belongs. Therefore, the researcher measured the internal consistency of the questionnaires by calculating the correlation coefficients between the score of each statement and the total score of the variable to which it belongs. According to Kaiser (1974) study, a correlation coefficient of less than 0.5 is removed from the questionnaire.

Convergent Validity: The average variance between statements that measure the same scale is measured by calculating the average variance extracted (AVE), whose value must be greater than 0.5 according to Hair et al (2006).

The following tables show the statistical results for (correlation coefficients, standard deviation, calculated T value, and P value between the score of each statement and the total score of the variable to measure the validity of the internal consistency of the questionnaires. Also, calculating the value of the average variance extracted (AVE) to measure the convergent validity of the questionnaires through the equation model. Structural **SPSS version 28**, as follows:

Validity and reliability of Independent Variable

Variable		Statements	KMO	Factor loadings	Standard deviation	P Values	Average variance extracted
Communication Practices	Frequency of Communication	A1	0.798	0.823	1.227	0.786	0.788
		A2		0.694	1.352		
		A3		0.778	1.193		
		A4		0.838	1.261		
		A5		0.795	1.32		
	Clarity of Communication	B1		0.809	1.247	0.794	
		B2		0.787	1.279		
		B3		0.83	1.332		
		B4		0.782	1.303		
		B5		0.762	1.39		
	Communication Barriers	C1		0.833	1.339	0.812	
		C2		0.846	1.325		
		C3		0.886	1.299		
		C4		0.685	1.289		
		C5		0.81	1.361		
	Team Collaboration	D1		0.742	1.293	0.799	
		D2		0.79	1.304		
		D3		0.789	1.293		
		D4		0.866	1.369		
		D5		0.806	1.292		

Figure# 9 - Validity and reliability of Independent Variable

It is clear from the table above:

The scale of applying the first variable: All correlation coefficients for all statements are strongly correlated with their Independent variable (**the variable and its dimensions**), at values greater than 0.7. In addition, the values of all correlation

coefficients for the statements are statistically significant at a significance level less than 0.001. Accordingly, the internal consistency validity of the scale has been achieved. Also, from the results above related to the value of the average variance extracted AVE, it is clear that its value for the variable of applying **(the variable and its dimensions)** is $0.788 > 0.5$. Accordingly, the convergent validity of the questionnaire has been achieved.

Validity and reliability of dependent Variable

Variable		Statements	KMO	Factor loadings	Standard deviation	P Values	Average variance extracted
Project Timeline	Project Timeline Adherence	BA1	0.798	0.815	1.186	0.822	0.831
		BA2		0.842	1.414		
		BA3		0.787	1.268		
		BA4		0.873	1.233		
		BA5		0.793	1.423		
	Communication and Project Success	BB1		0.797	1.271	0.824	
		BB2		0.832	1.198		
		BB3		0.811	1.336		
		BB4		0.823	1.225		
		BB5		0.855	1.412		
	Communication and Problem-Solving	BC1		0.851	1.463	0.848	
		BC2		0.855	1.385		
		BC3		0.882	1.289		
		BC4		0.842	1.303		
		BC5		0.812	1.329		

Figure# 10 - Validity and reliability of Dependent Variable

It is clear from the table above:

The scale of applying the first variable: All correlation coefficients for all statements are strongly correlated with their dependent variable **(the variable and its dimensions)**, at values greater than 0.7. In addition, the values of all correlation coefficients for the statements are statistically significant at a significance level less than 0.001. Accordingly, the internal consistency validity of the scale has been achieved. Also, from the results above related to the value of the average variance extracted AVE, it is clear that its value for the variable of applying **(the variable and its dimensions)** is $0.831 > 0.5$. Accordingly, the convergent validity of the questionnaire has been achieved.

4.3.2 Reliability of the study tool

The stability of the questionnaire refers to the stability of the questionnaire results and their non-change significantly if they were redistributed to the sample individuals several times during specific time periods. To measure the stability of the questionnaires used to measure the study variables, Cronbach's alpha values were calculated using SPSS version 28. According to (2010) Hair et al, the value must be greater than 0.7 for the scale to be stable.

Reliability of the Study tools

Variable		Number of Statements	Cronbach's alpha	
Communication Practices	Frequency of Communication	5	0.958	0.953
	Clarity of Communication	5	0.950	
	Communication Barriers	5	0.946	
	Team Collaboration	5	0.958	
Project Timeline	Project Timeline Adherence	5	0.952	0.937
	Communication and Project Success	5	0.939	
	Communication and Problem-Solving	5	0.919	

Figure# 11 - Reliability of the Study tools

The result Research tool for the independent Variable (Communication Practices) Showed that the value of Cronbach's alpha and Composite Reliability for this Variable over all was **0.953**, and for the dimension of this variable the value of Cronbach's alpha and Composite Reliability for Frequency of Communication **0.958**, Clarity of Communication **0.950**, Communication Barriers **0.946**, Team

Collaboration **0.958**. since all values are over **0.7** and as per **Hair et al** study (2010) the Reliability was achieved

The result Research tool for the dependent Variable (Project timeline) Showed that the value of **Cronbach's alpha and Composite Reliability** for this Variable over all was **0.937**, and for the dimension of this variable the value of Cronbach's alpha and Composite Reliability for Project Timeline Adherence **0.952**, Communication and Project Success **0.932**, Communication and Problem-Solving **0.919**. and since all values are over **0.7** and as per **Hair et al** study (2010) the Reliability was achieved.

According to the statistical result above which prove the Reliability of Research tools which mean that we could relay on it's result and use it to for the hypothesis test for this study

Descriptive analysis of the study variables

The answers for this questionnaire were measured on five- point Likert scale, as below

Strongly agree	Agree	Neutral	Neutral	Strongly disagree
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Then the relative weight corresponding to each category is calculated by multiplying the arithmetic mean by $(100 \div 5)$, where 5 is the five-point scale, the table below is to clarify the significance of arithmetic averages

level (degree) Practice/importance	Relative weight %	Result (general trend)	The value of the arithmetic mean
very low	From 20 to less than 36%	Strongly disagree	From 1 to less than 1.80
Low	From 36 to less than 52%	Disagree	From 1.80 to less than 2.60
Middle	From 52 to less than 68%	Neutral	From 2.60 to less than 3.40
High	From 68 to less than 84%	Agree	From 3.40 to less than 4.20
very high	From 84 to less than 100%	Strongly agree	From 4.20 to less than 5

The following table shows the descriptive analysis of the study variables represented by the arithmetic means based on the five-point Likert scale and the standard deviations of the variables according to the table related to the importance of the arithmetic mean.

Variable		Arithmetic Mean		Standard deviation		General trend		Level of importance	
Communication Practices	Frequency of Communication	3.646	3.586	1.271	1.303	Agree	Agree	High	High
	Clarity of Communication	3.554		1.310		Agree		High	
	Communication Barriers	3.558		1.323		Agree		High	
	Team Collaboration	3.588		1.310		Agree		High	
Project Timeline	Project Timeline Adherence	3.635	3.705	1.305	1.316	Agree	Agree	High	High
	Communication and Project Success	3.830		1.288		Agree		High	
	Communication and Problem-Solving	3.651		1.354		Agree		High	

Figure# 12 - Descriptive analysis of the study variables

As per the results mentioned in the schedule above for the Arithmetic Mean and Standard deviation for this study variables, we found the following

The result Research tool for the **independent Variable (Communication Practices)** state that the general trend towards to high agreement which refers to high utilization of communication in Trimtech Industries Doors and Hardware Company in Edmonton, Alberta, Canada. Since the Arithmetic Mean for this Variable over all was 3.586 with agreement percentage of 69.1% and Standard deviation 1.303, for the dimension of this variable and it's high level of agreement

The result Research tool for the **dependent Variable (Project timeline)** state that the general trend towards to high agreement which refers to high utilization of communication in Trimtech Industries Doors and Hardware Company in Edmonton, Alberta, Canada. Since the Arithmetic Mean for this Variable over all was 3.705 with agreement percentage of 68.4% and Standard deviation 1.316, for the dimension of this variable and it's high level of agreement

Linear correlation coefficients between the study variables

Variable		Frequency of Communication	Clarity of Communication	Communication Barriers	Team Collaboration	Communication Practices	Project Timeline Adherence	Communication and Project Success	Communication and Problem-Solving	Project Timeline
Frequency of Communication	Pearson Correlation	1	.866**	.864**	.846**	.940**	.862*	.801**	.869**	.880**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Clarity of Communication	Pearson Correlation	.866**	1	.921**	.848**	.956**	.822*	.766**	.811**	.834**
	Sig. (2-tailed)	<.001		<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Communication Barriers	Pearson Correlation	.864**	.921**	1	.884**	.965**	.842*	.853**	.880**	.895**
	Sig. (2-tailed)	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Team Collaboration	Pearson Correlation	.846**	.848**	.884**	1	.941**	.837*	.844**	.826**	.871**
	Sig. (2-tailed)	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Communication Practices	Pearson Correlation	.862**	.822**	.842**	.837**	.884**	1	.851**	.884**	.950**

	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001		<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Project Timeline Adherence	Pearson Correlation	.801**	.766**	.853**	.844**	.859**	.851*	1	.910**	.958**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001		<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Communication and Project Success	Pearson Correlation	.869**	.811**	.880**	.826**	.890**	.884*	.910**	1	.971**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001		<.001
	N	57	57	57	57	57	57	57	57	57
Communication and Problem-Solving	Pearson Correlation	.880**	.834**	.895**	.871**	.915**	.950*	.958**	.971**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57
Project Timeline	Pearson Correlation	.940**	.956**	.965**	.941**	1	.884*	.859**	.890**	.915**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
	N	57	57	57	57	57	57	57	57	57

Figure# 13 - Linear correlation coefficients between the study variables

Linear correlation coefficients between the study variables

We found that there is significant relationship between the two Variables and their Dimensions with a value of less than (0.01)

Results of testing the validity of the study hypotheses

The study hypotheses Independent States that there is a significant positive relationship between the two Variables (Communication Practices and project timeline) and their Dimensions

To test these hypotheses, we used the (**Simple Linear Regression Analysis**) which considered as one of the famous statistical methods to test the relation of 2 variables and this method has been used to study the relation between **Communication Practices** which is the independent variable and **Project timeline** which is the dependent variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.915 ^a	.837	.834	.44220

a. Predictors: (Constant), Communication_Practices

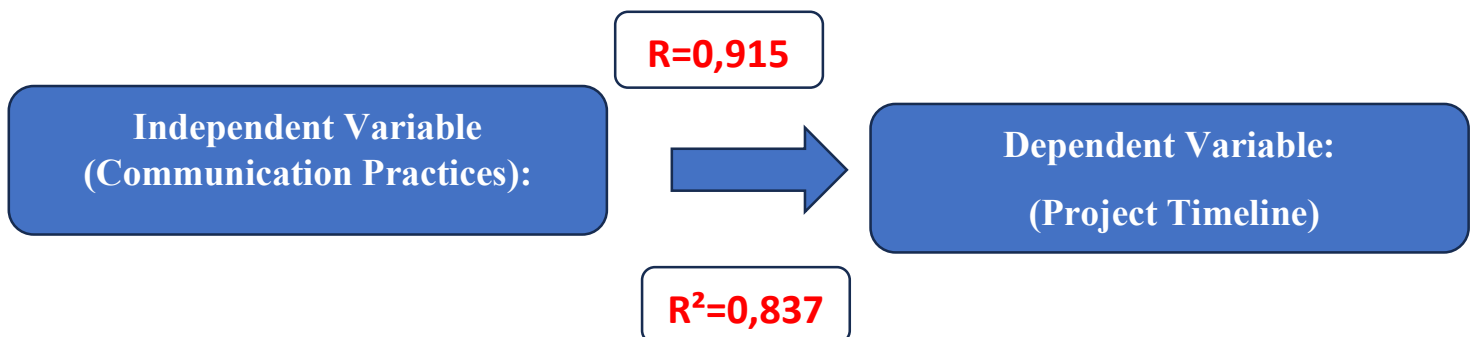
Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	-.114	.728
	Communication_Practices	.835	1.060

a. Dependent Variable: Project_Timeline

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.307	.210		1.460	.150
	Communication_Practices	.948	.056	.915	16.829	<.001



Conclusion

There is a positive relationship with statistical significance between the independent variable and the dependent variable

This research aimed to investigate the impact of team communication on project timelines within Trimtech Industries, a company specializing in hollow metal and wooden doors in Edmonton, Alberta, Canada. The study focused on the dimensions of communication, including frequency, clarity, and timeliness, as well as the level of team collaboration and information sharing.

Based on the findings of this research, Trimtech Industries can implement the following strategies to improve project timelines:

1. **Encourage frequent communication:** Promote regular communication among project stakeholders, including design teams, procurement specialists, and installers.
2. **Prioritize clear communication:** Emphasize the importance of clear and concise communication, using precise language and visual aids to convey information effectively.
3. **Ensure timely responses:** Establish clear guidelines for responding to inquiries and resolving issues promptly.
4. **Foster team collaboration:** Encourage collaborative communication practices, such as team meetings and joint problem-solving sessions.
5. **Implement effective information sharing:** Utilize centralized repositories and standardized communication protocols to facilitate efficient information exchange.

By adopting these strategies, Trimtech Industries can enhance project efficiency, reduce costs, and improve customer satisfaction.

References

- Akintola, M., Ibidunmoye, O., & Ajayi, A. (2017). Communication challenges in construction projects in Nigeria. *Acta Technical Napocensis - Series: Civil Engineering*, LVIII(IV), 641-650.
- Akinci, B., Fischer, M., & Levitt, R. (2006). Visual communication in design and construction: A framework for future research. *Engineering, Construction and Architectural Management*, 13(4), 291-305.
- Baccarini, D. (1999). The logical framework method for planning project activities. *Project Management Journal*, 30(4), 25-32.
- Chan, A. P. C., & Haas, C. T. (2004). Is partnering good business? An exploration of the relationship between partnering and project success rates. *International Journal of Project Management*
- Love, P. E. D., Edwards, D. J., & Davies, J. P. (2002). *Project communications management*. Thomas Telford.
- Sahlin-Andersson, K., & Söderlund, M. (2012). The importance of communication in collaborative building production in single-family house manufacturing. *Building Science*
- Abdul Hamid, Z., Ahamad, F., & Chen, S. (2018). Factors affecting construction project performance: A review. *International Journal of Advanced Research in Engineering and Technology*
- Ahn, S., Lee, H., & Kim, H. (2013). Communication factors affecting project performance in construction. *Journal of Construction Engineering and Management*,
- Toole, T. (2005). *Construction site communication and information management*. Blackwell Publishing Ltd.

- Silberstein, M., Dvir, D., & Katz-Bakan, R. (2010). Knowledge sharing and innovation: The role of trust and communication. *Journal of Engineering and Technology Management*, 27(1), 1-18.
- Fellowes, R., Cooper, C., & Luthans, F. (2003). Trust, communication, and team performance: The role of managerial support. *Group & Organization Management*, 28(1), 20-44.
- Babak Moeini, Akram Karimi-Shahanjarini, Ali Reza Soltanian (2016) . The Effect of Communication Skills Training. *Journal of Education and Community Health* 3 (3) : 9-16.
- Aveyard, H. (2018). Doing a literature review- Releasing the Research Imagination