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**The Impact of Virtual Team Management Strategies on Project Completion in the
Organizational Environment of Private Sector.**

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List of Acronyms and Abbreviations

A: Agree

D: Disagree

H1: Alternative Hypothesis

H0: Null Hypothesis

NU: Neutral

OEA: Operational Efficiency and Adaptability

SA: Strongly Agree

SD: Strongly Disagree

SPSS: Statistical Package for the Social Sciences

TDE: Virtual Team Dynamics and Environment

TMS: Virtual Team Management Strategies

Part I

INTRODUCTION

Introduction

The growth of organizational structures in the private sector today has led to the adoption of virtual teams as a fundamental component of modern project management. These geographically scattered persons united by technology to form virtual teams have become essential to the accomplishment of project objectives and corporate goals (Duran & Popescu, 2014). This research explores the significant impact that virtual team management techniques have on project completion in the context of private sector organizations in the Kingdom of Saudi Arabia.

Virtual teams are the perfect example of a dynamic workforce structure because of its distributed nature and use of communication technology to work together and achieve shared goals (Lilian, 2014). These teams work across borders, giving firms access to a variety of talent and knowledge on international scales. The emergence of digital connectivity has led to the integration of virtual teams into modern organizational structures, thereby transforming conventional ideas about work environment dynamics and project management. The private sector, characterized by its competitive nature and dynamic project environments, serves as an ideal context for investigating the multifaceted relationship between virtual team management strategies and project outcomes.

Using a variety of tactics designed to maximize output, productivity, and teamwork is essential for managing virtual teams effectively. These strategies take a variety of forms, such as coordinating team goals with organizational objectives, defining roles and responsibilities clearly even in the face of geographical dispersion, periodically reviewing and modifying management procedures, and leveraging technology to improve communication and project efficiency. Recognizing the strategic importance of successful project completion in achieving organizational goals, this research seeks to provide evidence-based insights that can inform decision-making processes and drive improvements in virtual team management practices.

Virtual teams have unique obstacles and difficulties that prevent smooth operations, even with their benefits. Communication hurdles resulting from language differences, time zone differences that impact synchronization, technical malfunctions that interrupt work processes, and the subtle nuances of establishing trust, responsibility, and unity among geographically separated team members are all challenges (Duran & Popescu, 2014). Establishing clear and effective communication protocols is paramount for virtual team success. This involves defining channels, frequency, and modes of communication to ensure that team members stay connected, well-informed, and engaged. Regular video conferences, collaborative platforms, and concise project documentation contribute to fostering transparent communication within virtual teams.

The purpose of this study is to examine in detail the effects of several virtual team management techniques on project completion in the organizational environment of the private sector. This research aims to determine the effectiveness of virtual team management techniques in removing obstacles and raising project completion rates by looking at the interactions between these tactics, organizational dynamics, and project outcomes.

In Saudi Arabia's private engineering sectors, while virtual teams offer promising avenues for project management and collaboration, several unique challenges impede their effective implementation. Addressing these challenges is crucial to understanding the impact of virtual team management strategies on project completion within this specific organizational environment.

The private engineering sectors in Saudi Arabia frequently have a diverse workforce, which can cause communication difficulties among geographically scattered team members as well as linguistic obstacles and differing work norms. Within virtual teams, cultural variations may have an impact on decision-making procedures, communication approaches, and dispute resolution techniques.

Although the foundation of virtual teams is technology, uneven access and infrastructure across Saudi Arabia's various provinces and regions can make it difficult for members to work together effectively. Functioning virtual teams might be hampered by inequalities in compatibility, high-speed internet connection, and dependable communication technologies. Leveraging cutting-edge technology is essential for optimizing virtual team performance. Identifying and implementing collaborative tools, project management platforms, and virtual communication solutions that align with the organization's goals and the nature of the project can significantly enhance coordination and efficiency within virtual teams.

Managing time zone differences presents a substantial problem, especially for initiatives that are global in scope. Complex meeting planning, teamwork, and decision-making processes may have an impact on project deadlines and responsiveness. Recognizing the dynamic nature of virtual team environments, strategies should be designed with flexibility and adaptability in mind. This includes acknowledging different time zones, accommodating diverse working styles, and being responsive to unforeseen challenges. Strategies that prioritize flexibility enable virtual teams to navigate complexities and adjust seamlessly to changing project requirements.

It could be difficult to build cohesiveness and trust amongst team members who don't often communicate in person. Physical distance and cultural differences can make it difficult to develop relationships and promote a sense of togetherness, trust, and accountability. Communication is crucial in virtual teams as it facilitates understanding, trust, and collaboration among members who may be geographically dispersed (Duran & Popescu, 2014). Building a culture of collaboration is integral to the success of virtual teams. This involves fostering a sense of shared purpose, trust, and accountability among team members. Encouraging open dialogue, recognizing achievements, and promoting knowledge sharing contribute to creating a collaborative environment that is conducive to effective virtual team management.

Effective leadership and management styles that cater to the virtual team environment might require adaptation. Encouraging autonomy while maintaining direction, providing support, and keeping the team motivated without physical presence can pose challenges for leaders. Strong leadership is imperative for guiding virtual teams towards project success. Leaders must possess the skills to motivate, inspire, and facilitate collaboration in a virtual setting. Team-building activities, even in the virtual space, are essential for creating cohesion and rapport among team members, fostering a sense of belonging and commitment to project goals.

It's critical to follow different regulatory frameworks and guarantee data security and confidentiality while working with virtual teams (Lilian, 2014). In a digital workforce, cybersecurity protocols and regulatory obligations become increasingly complex to comply with.

It takes specialized training programs to give team members the tools they need to succeed in virtual environments. To ensure successful collaboration, one must be proficient in handling distant work, using communication tools, and comprehending cultural differences.

One of the main goals of the study is to comprehend how these obstacles interact with the application of virtual team management techniques and how they affect project completion in the

Saudi private engineering sectors. Investigating how businesses deal with these obstacles and use particular management techniques to get beyond them may offer insightful information about improving project results in this particular setting.

It is possible to assess the effectiveness of virtual team management strategies in reducing these obstacles and their final influence on project completion within Saudi Arabia's private engineering sectors by tackling these issues within the parameters of the research.

Part II

Theoretical Framework of the Study

CHAPTER 1

Problem of the study and its importance

1. Research Problem

The research problem is focused on investigating the challenges and effectiveness of managing virtual teams in the private sector. The study will explore issues like communication barriers, team cohesion, leadership strategies, and the impact of these factors on project completion within virtual teams operating in private organizations.

In addition, how can organizations effectively navigate cultural diversity, time zone differences, and communication challenges to enhance the performance and collaboration of virtual teams in the context of global projects in private engineering sectors? (Lilian,2014).

This section will outline the challenges faced by private sector organizations in managing virtual teams and the impact of these challenges on project completion rates. It will establish the need for effective structured approaches to overcome these obstacles.

Identifying gaps in research helps highlight areas where further investigation is needed. In the context of this research and some potential gaps could be:

- *Limited Focus on Private Sector:* Existing research might predominantly concentrate on virtual team management in general, with less specific focus on the private sector (Lilian,2014). This gap could entail the need for insights and strategies tailored to the unique dynamics, challenges, and needs of private sector organizations.
- *Insufficient Investigation into Strategy Efficacy:* While studies may have examined general strategies for virtual team management, there might be a gap in exploring the effectiveness of these strategies specifically in relation to project completion within the private sector (Haron, Hua, & Hassim, 2019).
- *Lack of Emphasis on Diverse Strategies:* There might be a gap in understanding a broad range of strategies used in the private sector, including how different industries or organizational sizes implement and benefit from various virtual team management approaches (Haron, Hua, & Hassim, 2019).
- *Underexplored Impact of Leadership Styles:* Current research might not thoroughly analyze the influence of different leadership styles on project completion within virtual teams operating in private sector organizations (Lilian, 2014).
- *Scarcity of Comprehensive Data on Challenges:* Research might lack a comprehensive assessment of the challenges faced by private sector virtual teams, particularly how these challenges directly impact project completion rates.

Filling these gaps could involve conducting specific studies that deeply explore the nuances of virtual team management strategies in the private sector, particularly how they impact project completion. Further investigations could involve diverse case studies or in-depth analyses of the interaction between different strategies, leadership styles, and challenges within the private sector's virtual team environments.

2. The Importance of the Research

The study on the impact of virtual team management strategies on project completion within the organizational environment of the private sector holds paramount importance in the contemporary business landscape. Firstly, understanding the dynamics of virtual teams is crucial as organizations increasingly adopt flexible work arrangements. As remote work becomes more prevalent, identifying effective management strategies becomes a strategic imperative. The findings of this study will provide valuable insights into the specific approaches that lead to successful project completion in virtual team settings, enabling organizations to optimize their operational efficiency.

Secondly, the research addresses a significant gap in the existing literature by delving into the private sector context. While virtual teams have become commonplace, the nuances of managing these teams in the private sector, where project completion often directly translates into organizational success, warrant specialized attention. The study contributes to filling this gap by examining the unique challenges and opportunities faced by private sector organizations, offering tailored recommendations for optimizing virtual team management strategies.

Lastly, the study's outcomes have practical implications for organizational leaders, project managers, and decision-makers in the private sector. By uncovering the impact of virtual team management strategies on project completion, the research equips leaders with evidence-based insights to make informed decisions. Implementing effective strategies identified through the study can lead to increased productivity, reduced project timelines, and ultimately, a competitive advantage in the dynamic and evolving landscape of the private sector. The study's importance lies not only in contributing to academic knowledge but also in providing actionable intelligence that can directly influence the success of private sector organizations navigating the complexities of virtual team dynamics.

3. The Objectives of the Research

The primary objective of the research is to investigate and comprehensively understand the dynamics between virtual team management strategies and project completion within the context of private sector organizations in the kingdom of Saudi Arabia. The study aims to contribute valuable insights into the specific strategies that enhance or hinder project completion rates, considering the unique challenges and opportunities prevalent in private sector settings. By addressing this objective, the research seeks to bridge the existing gap in literature and provide a nuanced understanding of how virtual teams operate and succeed in private sector environments.

A secondary objective of the research is to identify and catalogue the various virtual team management strategies commonly employed by private sector organizations. Through a thorough examination of the strategies in use, the study aims to create a comprehensive inventory that can serve as a practical guide for organizations looking to optimize their virtual team management practices. This objective aligns with the broader goal of offering practical, real-world solutions to the challenges faced by private sector organizations in ensuring the successful completion of projects within virtual team structures.

Furthermore, the research seeks to evaluate the correlation between the identified virtual team management strategies and project completion rates. By employing both qualitative and quantitative research methods, the study aims to establish empirical evidence on the effectiveness of specific strategies in influencing project outcomes. This objective is critical for establishing a causal link between the applied virtual team management strategies and the ultimate success or failure of projects within private sector organizations.

Lastly, the research aims to investigate the challenges faced by private sector organizations in implementing virtual team management strategies and how these challenges impact project completion. Understanding the obstacles and barriers to effective strategy implementation is integral to providing practical recommendations for overcoming these challenges. This objective aligns with the overarching goal of offering actionable insights that can inform organizational leaders and managers in the private sector, enabling them to make informed decisions to enhance project completion rates within virtual teams.

4. Research Questions

This research can address various questions related to virtual team management and project completion in the private sector, such as:

- **Communication:** How do communication strategies impact project completion in virtual teams?
- **Leadership:** What leadership styles and approaches are most effective in managing virtual teams for successful project outcomes?
- **Challenges:** What are the key challenges faced by virtual teams in the private sector, and how do these challenges impact project completion rates?
- **Technology:** How do different technological tools and platforms influence the management and productivity of virtual teams in project environments?
- **Cultural and Diversity Impact:** How does cultural diversity within virtual teams affect project completion, and what strategies can mitigate potential issues?
- **Performance Metrics:** What specific performance metrics can be used to measure the success of virtual team management strategies in project completion?
- **Best Practices:** What are the best practices that can be adopted by organizations to enhance project completion rates in virtual team environments?

Answering these questions can provide valuable insights and recommendations for improving the management of virtual teams and, consequently, the successful completion of projects in the private sector.

Managing virtual teams in the private sector has become increasingly important, especially in the context of project completion.

CHAPTER 2

Research Hypothesis and Variables with Correlation

1. Introduction

One of the most important factors influencing project performance in the private sector in the dynamic world of organizational dynamics is managing virtual teams. At the heart of this investigation lie two crucial independent factors that outline the fundamental elements shaping the operational environment: Virtual Team Management Strategies (TMS) and Virtual Team Dynamics and Environment (TDE).

Virtual team management strategies (TMS) are a collection of techniques that are carefully designed and used to manage the complex dynamics of virtual teams (Lilian, 2014). TMS is the cornerstone that directs the way things are done in the virtual team environment. It includes things like sophisticated communication tactics, a strong technology foundation, tactical team-building activities, and efficient leadership techniques.

In addition to TMS, Virtual Team Dynamics and Environment (TDE) clarifies the external environment, group dynamics, and general climate of the virtual team (Morley, Cormican, & Folan, 2015). This variable reflects a multitude of aspects, such as the effectiveness of teamwork, efficient channels of communication, the availability, quality and capability of technological resources, developed trust within the team, and the effectiveness of leadership initiatives.

Simultaneously, the study's major goal is to comprehend how these independent variables affect Project Completion (Operational Efficiency and Adaptability, or OEA). OEA serves as an assessment tool, defining the standards for flexibility and efficacy in accomplishing project objectives inside the private sector organizational structure. The real outcomes shaped by the strategic interaction between implemented virtual team management strategies (TMS) and the intrinsic dynamics and environmental elements (TDE) present in virtual team interactions are represented by OEA, the dependent variable.

In summary, this study explores the complex relationships between the important domains of Virtual Team Dynamics and Environment (TDE), Virtual Team Management Strategies (TMS), and the resulting effects on Project Completion (OEA) within the complex framework of the private sector organizational environment.

2. Research Hypotheses

Below is a conceptual model outlining the impact of virtual team management strategies on project completion in the organizational environment of the private sector, along with associated hypotheses.

Conceptual Model:

Independent Variables: Virtual Team Management Strategies (**TMS**) and Virtual Team Dynamics and Environment (**TDE**).

1. **Communication Strategies:** Utilization of efficient communication tools, frequency of communication, clarity, and transparency in communication within virtual teams.
2. **Technological Infrastructure:** Quality and accessibility of technological tools, platforms, and resources available for virtual collaboration.
3. **Team Building and Leadership:** Strategies to foster teamwork, trust, and leadership development within virtual teams.

Dependent Variable: Project Completion (Operational Efficiency and Adaptability (**OEA**))

$$OEA = a_0 + a_1 * TMS + a_2 * TDE + u$$

The dependent Variable is **OEA** and the independent variables are **TMS & TDE**.

For the purpose of developing null and alternative hypotheses, the Likert scale items were divided into three larger categories, which allows for a more thorough and nuanced analysis.

Category 1: Perception of Virtual Team Management Strategies

Null Hypothesis (H0):

H0: There is no significant relationship between virtual team management strategies and project completion rates or outcomes.

Alternative Hypothesis (H1):

H1: There is significant relationship between virtual team management strategies and project completion rates or outcomes.

Questions:

TMS1: The virtual team management strategies implemented in our organization are effectively aligned with our project goals.

TMS2: The defined roles and responsibilities within our virtual team are clear and contribute to successful project completion.

TMS3: Regular evaluation and adaptation of our virtual team management strategies positively impact our project completion.

TMS4: The virtual team management strategies used in our organization effectively address and overcome communication barriers hindering project completion.

TMS5: The virtual team management strategies implemented have enhanced overall team collaboration and synergy in achieving project goals.

TMS6: Regular reviews and updates of virtual team management strategies contribute significantly to improved project outcomes.

Category 2: Perception of Team Dynamics and Environment

Null Hypothesis (H0):

H0: There is no significant relationship between virtual team dynamics and environment and project completion rates or outcomes.

Alternative Hypothesis (H1):

H1: There is significant relationship between virtual team dynamics and environment and project completion rates or outcomes.

Questions:

TDE1: Trust and accountability are promoted within our virtual team, positively impacting our project outcomes.

TDE2: Cultural sensitivity and inclusivity within our virtual team environment positively affect our project outcomes.

TDE3: The leadership style within our virtual team fosters a conducive environment for achieving successful project outcomes.

TDE4: The emphasis on trust and accountability within our virtual team positively impacts our project outcomes.

TDE5: Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team.

Category 3: Perception of Operational Efficiency and Adaptability

Null Hypothesis (H0):

H0: There is no significant relationship between operational efficiency and adaptability and project completion rates or outcomes.

Alternative Hypothesis (H1):

H1: There is significant relationship between operational efficiency and adaptability and project completion rates or outcomes.

Questions:

OEA1: The communication channels utilized within our virtual team effectively facilitate project progress and completion.

OEA2: The utilization of technology tools within our virtual team significantly enhances our ability to collaborate and complete projects efficiently.

OEA3: Flexibility in scheduling and adapting to time zone differences effectively contributes to our project completion rates.

OEA4: The leadership style within our virtual team significantly influences our project completion rates.

OEA5: Our virtual team effectively adapts to changing project requirements, positively influencing project completion rates.

OEA6: The implemented strategies sufficiently address challenges arising from cultural diversity within the virtual team, positively impacting project completion.

OEA7: The utilization of communication platforms within our virtual team significantly influences the efficiency of project completion.

OEA8: The strategies implemented effectively address and mitigate technology-related challenges, positively influencing project completion rates.

OEA9: The strategies used to manage time zone differences significantly contribute to successful project completion within our virtual team.

Part III

Practical Study and Methodological Procedures

CHAPTER 3

Methodology and Research Methods

1. Methodology and Research Methods

The methodology and research methods proposed for investigating "The Impact of Virtual Team Management Strategies on Project Completion in the Organizational Environment of Private Sector" are integral to ensuring a robust and comprehensive study.

1. Research Design: The study will adopt a mixed-methods research design, combining both *qualitative and quantitative approaches*. This hybrid design allows for a holistic understanding of the research problem, capturing both the depth of individual experiences and the breadth of organizational practices. *Qualitative methods* involve gathering non-numerical data such as interviews, focus groups, or content analysis, will provide rich insights into the nuances of virtual team management, while *quantitative methods* involve collecting numerical data through surveys and questionnaires will enable the collection of structured data for statistical analysis. This combination is particularly advantageous for exploring the multifaceted dynamics of virtual teams in the private sector.

2. Sampling Strategy: The research will employ a stratified random sampling approach to ensure representation across different industries and organizational sizes within the private engineering sectors in Kingdom of Saudi Arabia. This method enables the selection of participants from various private sectors, enhancing the generalizability of the findings. Participants will include employees, managers, and executives involved in virtual team management, offering diverse perspectives on the impact of strategies on project completion.

3. Data Collection Methods: Qualitative data will be gathered through semi-structured interviews, allowing for in-depth exploration of participants' experiences, perceptions, and challenges related to virtual team management. Additionally, quantitative data will be collected through questionnaires designed to capture numerical information on the prevalence and effectiveness of specific strategies. The use of both methods will facilitate a triangulated analysis, enhancing the credibility and validity of the study.

4. Data Analysis: Qualitative data will undergo thematic analysis, identifying recurring patterns, themes, and relationships. This method allows for a nuanced interpretation of participants' narratives. Quantitative data will be analyzed using statistical tools such as SPSS, examining correlations between virtual team management strategies and project completion rates. The integration of both qualitative and quantitative findings will provide a comprehensive understanding of the research problem.

5. Ethical Considerations: Ethical considerations will be prioritized throughout the research process. Informed consent will be obtained from all participants, ensuring they are aware of the study's purpose and their rights. Confidentiality measures will be implemented to protect participants' identities, and steps will be taken to minimize any potential harm. The research will adhere to ethical guidelines and standards to maintain the integrity of the study and respect the well-being of participants.

In summary, the proposed methodology combines qualitative and quantitative methods to investigate the impact of virtual team management strategies on project completion in the private engineering sectors in Kingdom of Saudi Arabia. This approach ensures a comprehensive exploration of the research problem, with careful attention to ethical considerations and a commitment to producing valid and reliable results.

CHAPTER 4

Field Results

1. Research Tools (Data Collection Tools)

For the qualitative aspect of the study, semi-structured interviews will be employed as the primary data collection tool. A semi-structured format allows for flexibility, ensuring that the conversation flows naturally while still maintaining a focus on key research questions. The interview protocol will be carefully designed to explore participants' experiences with virtual team management strategies, challenges faced, and perceptions of their impact on project completion. Probing questions will be included to delve deeper into specific aspects, such as communication, leadership, and technology utilization within virtual teams.

Surveys will serve as the primary quantitative data collection tool, providing a structured and standardized approach to gather numerical information. The survey instrument will be designed to quantify the prevalence of different virtual team management strategies within the private sector. Likert-scale questions will be employed to assess the effectiveness of these strategies in relation to project completion rates. Additionally, demographic questions will be included to capture variations in responses based on participants' roles, industries, and organizational sizes.

The survey will be carefully crafted to ensure clarity, reliability, and validity. It will consist of multiple sections, covering topics such as communication strategies, leadership styles, technology usage, and challenges faced in virtual teams. Closed-ended questions with predefined response options will facilitate quantitative analysis, allowing for statistical comparisons and correlations. The survey design will also incorporate skip logic and branching to tailor questions based on participants' previous responses, ensuring relevance and engagement.

Before the full-scale implementation of the survey and interview protocols, a pilot study will be conducted with a small sample of participants. This pilot phase aims to identify any ambiguities or potential issues in the questions and refine the instruments accordingly. Following the pilot, the tools will be further validated by consulting with experts in virtual team management and project completion to ensure that the questions accurately capture the intended constructs and provide meaningful insights.

The combination of qualitative and quantitative data will enable a comprehensive analysis of the research problem through triangulation. By comparing and contrasting findings from both types of data, the study aims to enhance the overall validity and reliability of the results. The integration of qualitative insights from interviews with quantitative patterns identified through surveys will provide a holistic understanding of how virtual team management strategies impact project completion in the private sector.

2. Fields of Research and Research Limits

The examination of virtual team management strategies in the private engineering sector involves a comprehensive exploration across three key fields of study: human, spatial, and temporal dimensions (Morley, Cormican, & Folan, 2015). In the human domain, the study seeks to understand the intricacies of team dynamics, leadership styles, and interpersonal relationships within virtual teams in the engineering private sector. This includes investigating how the human element influences decision-making processes, communication effectiveness, and overall team cohesion, all of which are pivotal for successful project completion.

Spatial considerations play a significant role, especially in the context of the private engineering private sector. Given the often-dispersed nature of engineering teams across different locations, the spatial field of study aims to unravel the impact of physical distance on collaboration, coordination, and knowledge sharing. Understanding how spatial factors influence the selection and utilization of virtual collaboration tools is crucial for developing strategies that address the specific spatial challenges faced by engineering teams in the private sector.

Temporal factors, encompassing project timelines and the dynamic nature of work, constitute another critical field of study. In the private engineering sector, where projects often have stringent timelines, understanding how temporal factors influence team productivity, adaptability to changing requirements, and overall project success is imperative. The study will investigate the role of time management, responsiveness to project changes, and the effective utilization of temporal flexibility afforded by virtual teams in the engineering domain.

The integration of these three fields—human, spatial, and temporal—creates a comprehensive framework for analyzing the impact of virtual team management strategies on project completion in the private engineering sector. It involves exploring the interplay between human factors such as leadership styles and team dynamics, spatial challenges related to team dispersion, and temporal considerations regarding project timelines and adaptability. This interdisciplinary approach aims to provide a nuanced understanding of how these dimensions interact and influence the overall success of engineering projects in a virtual team environment.

For example, the study may delve into how leadership styles impact the spatial coordination of engineering teams across different locations and how temporal factors, such as project deadlines, influence decision-making processes within virtual teams (Blak Bernat, Qualharini, Castro, Barcaui, & Soares, 2023). By examining these intersections, the research seeks not only to contribute valuable insights to virtual team management strategies but also to provide actionable recommendations tailored to the organizational environment of the private engineering sector. The ultimate goal is to enhance project completion rates by addressing the unique challenges posed by the convergence of human, spatial, and temporal dimensions in the context of virtual team management.

This research proposal aims to investigate the impact of virtual team management strategies on project completion in the organizational environment of the private sector. However, it is essential to acknowledge potential limitations that may arise throughout the study. Firstly, the research may face challenges associated with self-reporting bias. The reliance on data obtained through surveys or interviews could lead to participants providing responses that are socially desirable or not entirely reflective of their actual experiences. To mitigate this limitation, the research will emphasize confidentiality, anonymity, and employ diverse data sources to triangulate findings,

ensuring a more accurate representation of the impact of virtual team management strategies on project completion.

Another limitation to be addressed is the potential lack of generalizability of the findings. The sample selection process will be carefully considered during the research design phase to ensure representation from various industries, organizational sizes, and geographic locations within the private sector. However, it is crucial to acknowledge that the findings may not be universally applicable to all private sector organizations due to the inherent diversity within this sector. The proposal will outline strategies to enhance external validity, such as employing a stratified random sampling approach and conducting subgroup analyses to identify potential variations in the impact of virtual team management strategies across different organizational contexts.

Additionally, the dynamic nature of the private sector and evolving technologies may pose a limitation. Virtual team management strategies are subject to continuous change and adaptation to emerging technologies. To address this, the proposal will incorporate a mechanism for ongoing review and potential modification of research methods to ensure the relevance of the findings to contemporary organizational practices. By transparently addressing these limitations in the proposal, the research aims to strengthen its methodological rigor and contribute meaningful insights into the complex relationship between virtual team management strategies and project completion in the private sector.

CHAPTER 5

Results and Proposal Analysis

Using Likert scale surveys is a common and effective method for collecting data, especially in studies involving perceptions, opinions, or attitudes (Blak Bernat, Qualharini, Castro, Barcaui, & Soares, 2023). Since Likert scale surveys have been distributed to participants from private engineering sectors in KSA, these are steps to be followed for analysis considering the nature of Likert scale data:

1. Data Preparation:

Collate the responses from the Likert scale surveys. Each question has responses on a scale (from 1 to 5) representing different levels of agreement, satisfaction, or frequency.

Table 1: Agreement Scale

Level	Agreement Scale
1	Strongly Disagree (SD)
2	Disagree (D)
3	Neutral (NU)
4	Agree (A)
5	Strongly Agree (SD)

2. Descriptive Statistics:

Calculate descriptive statistics (e.g., mean, median, mode) for each Likert scale question to understand central tendencies and distributions(Blak Bernat, Qualharini, Castro, Barcaui, & Soares,2023).

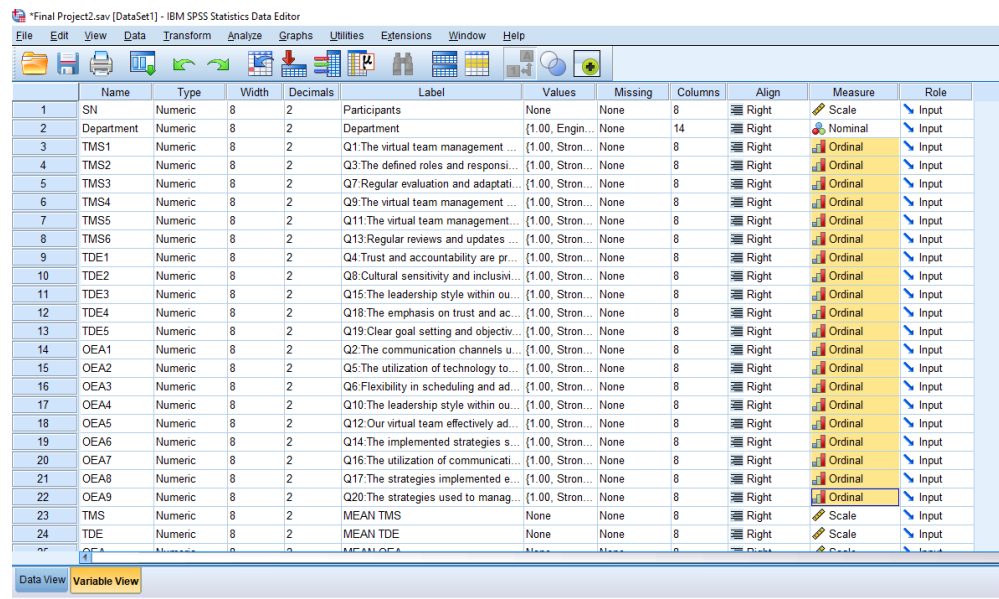
A. Analysis of Likert Scale using Ordinal Data.

1. The data falls under the Ordinal measure, indicating its non-normal distribution.
2. The analysis will solely rely on Median, Mode, and % frequency Distributions.
3. Employing this method aids in comprehending participant attitudes and opinions.
4. Optimal utilization of non-parametric tests, like Mann-Whitney U Test, Spearman (Rho) Correlation, Kruskal Wallis Test, and Ordinal Regression, is recommended for hypothesis testing.
5. Implement the collected data through SPSS software for analysis.

The suitable analytical data is to perform descriptive statistics by calculating only Median and/or Mode as Measure of central Tendency and calculated the percentage of frequency distributions of the different categories of the Likert scale. Then to test the hypothesis using the Null Hypothesis test such as Mann-Whitney U Test in this research.

1) SPSS Steps for Median and Mode:

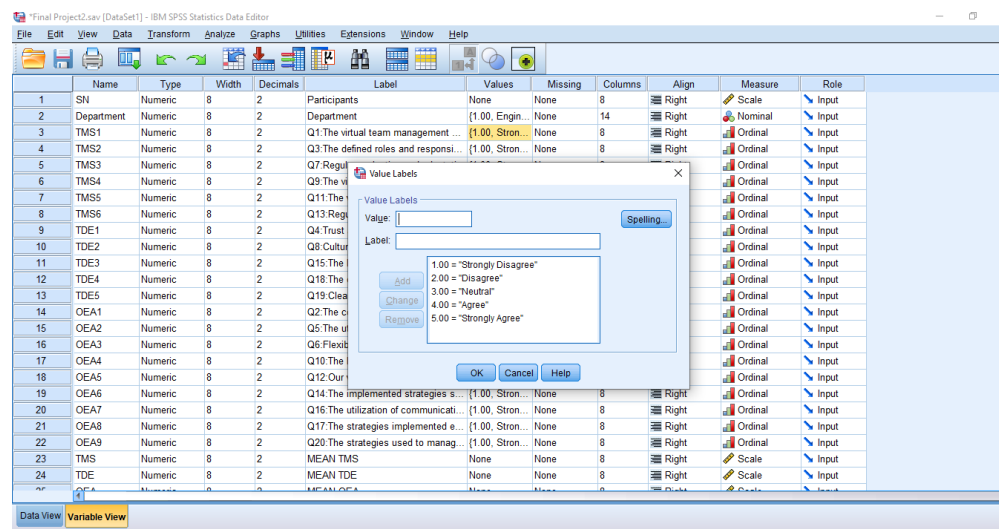
Step1: Define the Variables in Variable View



The screenshot shows the SPSS Variable View for a dataset named 'Final Project2.sav'. The 'Measure' column is highlighted, showing the measurement level for each variable. The variables are listed in the 'Name' column, and their corresponding measurement levels are in the 'Measure' column. The 'Role' column is also visible, showing the role of each variable (e.g., Input, Output, Target).

Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1 SN	Numeric	8	2	Participants	None	None	8	Right	Scale	Input
2 Department	Numeric	8	2	Department	{1.00, Engin...	None	14	Right	Nominal	Input
3 TMS1	Numeric	8	2	Q1:The virtual team management ...	{1.00, Stron...	None	8	Right	Ordinal	Input
4 TMS2	Numeric	8	2	Q3:The defined roles and responsi...	{1.00, Stron...	None	8	Right	Ordinal	Input
5 TMS3	Numeric	8	2	Q7:Regular evaluation and adaptati...	{1.00, Stron...	None	8	Right	Ordinal	Input
6 TMS4	Numeric	8	2	Q9:The virtual team management ...	{1.00, Stron...	None	8	Right	Ordinal	Input
7 TMS5	Numeric	8	2	Q11:The virtual team management...	{1.00, Stron...	None	8	Right	Ordinal	Input
8 TMS6	Numeric	8	2	Q13:Regular reviews and updates ...	{1.00, Stron...	None	8	Right	Ordinal	Input
9 TDE1	Numeric	8	2	Q4:Trust and accountability are pr...	{1.00, Stron...	None	8	Right	Ordinal	Input
10 TDE2	Numeric	8	2	Q8:Cultural sensitivity and inclusiv...	{1.00, Stron...	None	8	Right	Ordinal	Input
11 TDE3	Numeric	8	2	Q15:The leadership style within ou...	{1.00, Stron...	None	8	Right	Ordinal	Input
12 TDE4	Numeric	8	2	Q18:The emphasis on trust and ac...	{1.00, Stron...	None	8	Right	Ordinal	Input
13 TDE5	Numeric	8	2	Q19:Clear goal setting and objectiv...	{1.00, Stron...	None	8	Right	Ordinal	Input
14 OEA1	Numeric	8	2	Q2:The communication channels u...	{1.00, Stron...	None	8	Right	Ordinal	Input
15 OEA2	Numeric	8	2	Q5:The utilization of technology to...	{1.00, Stron...	None	8	Right	Ordinal	Input
16 OEA3	Numeric	8	2	Q6:Flexibility in scheduling and ad...	{1.00, Stron...	None	8	Right	Ordinal	Input
17 OEA4	Numeric	8	2	Q10:The leadership style within ou...	{1.00, Stron...	None	8	Right	Ordinal	Input
18 OEA5	Numeric	8	2	Q12:Our virtual team effectively ad...	{1.00, Stron...	None	8	Right	Ordinal	Input
19 OEA6	Numeric	8	2	Q14:The implemented strategies s...	{1.00, Stron...	None	8	Right	Ordinal	Input
20 OEA7	Numeric	8	2	Q16:The utilization of communicati...	{1.00, Stron...	None	8	Right	Ordinal	Input
21 OEA8	Numeric	8	2	Q17:The strategies implemented e...	{1.00, Stron...	None	8	Right	Ordinal	Input
22 OEA9	Numeric	8	2	Q20:The strategies used to manag...	{1.00, Stron...	None	8	Right	Ordinal	Input
23 TMS	Numeric	8	2	MEAN TMS	None	None	8	Right	Scale	Input
24 TDE	Numeric	8	2	MEAN TDE	None	None	8	Right	Scale	Input

Figure 1: SPSS Variable View -Measure



The screenshot shows the SPSS Variable View with the 'Value Labels' dialog box open. The dialog box is used to define the labels for the values of a variable. The 'Value' column is selected, and the 'Label' column is being edited. The dialog box shows the following values and labels:

Value	Label
1.00	"Strongly Disagree"
2.00	"Disagree"
3.00	"Neutral"
4.00	"Agree"
5.00	"Strongly Agree"

The dialog box also includes buttons for 'Add', 'Change', 'Remove', 'OK', 'Cancel', and 'Help'.

Figure 2: SPSS Variable View-Values-ordinal data

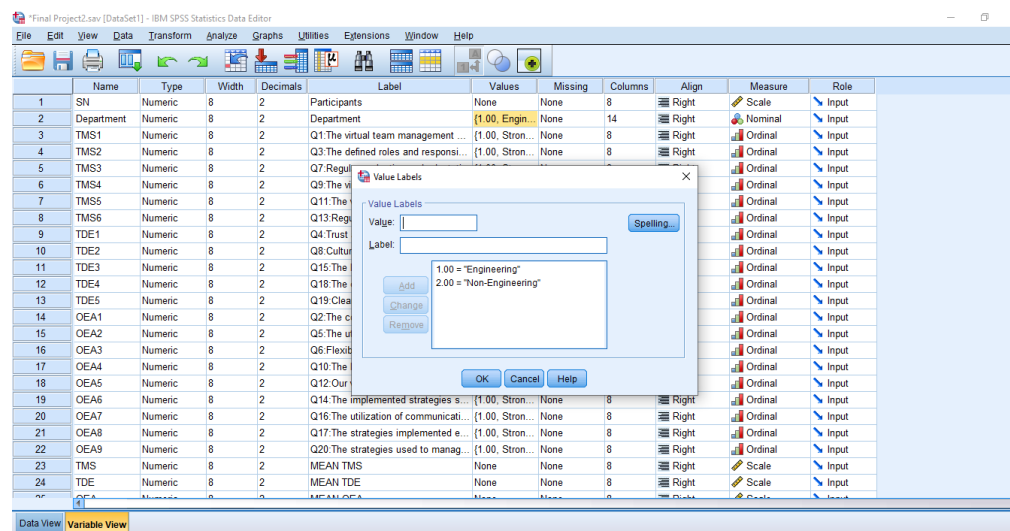


Figure 3: SPSS Variable View-Values Nominal data

Step2: Enter the data in the Data View

*Final Project2.sav [DataSet1] - IBM SPSS Statistics Data Editor

	SN	Department	TMS1	TMS2	TMS3	TMS4	TMS5	TMS6	TDE1	TDE2	TDE3	TDE4	TDE5	OE
1	1.00	1.00	3.00	3.00	1.00	1.00	5.00	3.00	1.00	1.00	4.00	4.00	3.00	
2	2.00	1.00	2.00	4.00	3.00	4.00	3.00	4.00	3.00	3.00	4.00	4.00	4.00	
3	3.00	1.00	3.00	4.00	4.00	4.00	3.00	4.00	5.00	4.00	5.00	5.00	5.00	
4	4.00	1.00	4.00	4.00	4.00	5.00	4.00	5.00	3.00	4.00	4.00	4.00	5.00	
5	5.00	1.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00	4.00	
6	6.00	2.00	4.00	4.00	4.00	4.00	5.00	4.00	4.00	3.00	4.00	4.00	4.00	
7	7.00	1.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
8	8.00	1.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
9	9.00	1.00	4.00	5.00	4.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	
10	10.00	1.00	3.00	3.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	
11	11.00	2.00	4.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	4.00	4.00	
12	12.00	1.00	4.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
13	13.00	1.00	4.00	5.00	4.00	3.00	4.00	5.00	5.00	3.00	4.00	4.00	4.00	
14	14.00	1.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	3.00	5.00	
15	15.00	2.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
16	16.00	1.00	3.00	4.00	4.00	3.00	2.00	3.00	4.00	2.00	4.00	4.00	3.00	
17	17.00	1.00	3.00	2.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00	4.00	
18	18.00	1.00	3.00	4.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	
19	19.00	2.00	4.00	2.00	5.00	4.00	4.00	4.00	4.00	5.00	5.00	4.00	5.00	
20	20.00	1.00	4.00	4.00	4.00	4.00	3.00	5.00	5.00	2.00	3.00	4.00	4.00	
21	21.00	2.00	3.00	4.00	3.00	4.00	2.00	4.00	4.00	4.00	2.00	4.00	4.00	
22	22.00	1.00	4.00	4.00	3.00	3.00	2.00	4.00	3.00	3.00	2.00	4.00	5.00	

Data View Variable View

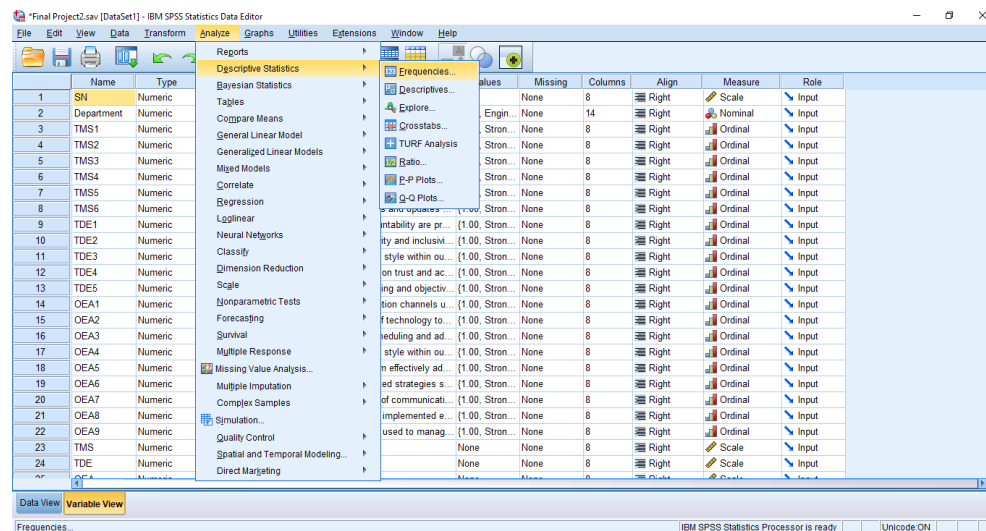
Figure 4: SPSS Data View-Data Entry

*Final Project2.sav [DataSet1] - IBM SPSS Statistics Data Editor

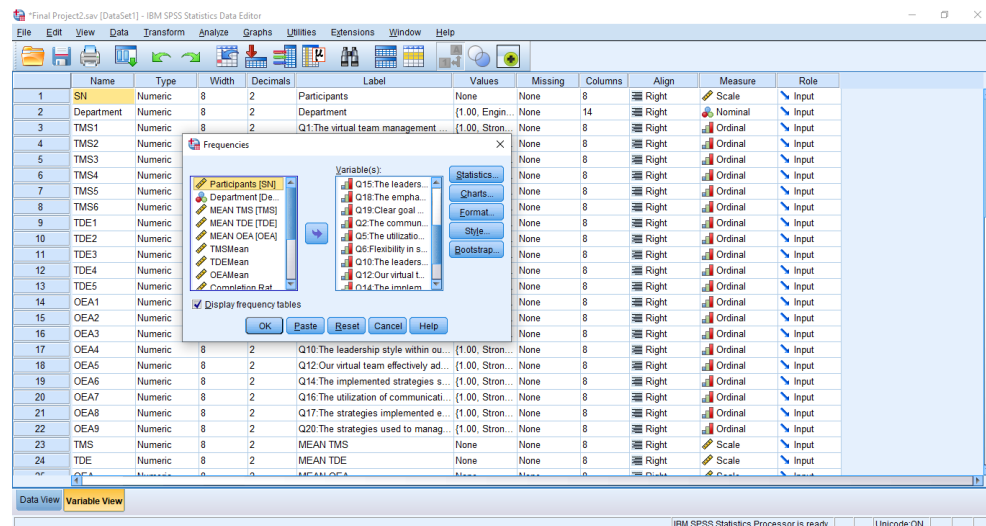
	SN	Department	TMS1	TMS2	TMS3	TMS4	TMS5	TMS6	TDE1	TDE2	TDE3	TDE4	TDE5	OE
1	1.00	Engineering	Neutral	Neutral	Strongly Disagree	Strongly Disagree	Strongly Agree	Neutral	Strongly Disagree	Strongly Disagree	Agree	Agree		
2	2.00	Engineering	Disagree	Agree	Neutral	Agree	Neutral	Agree	Neutral	Neutral	Agree	Agree		
3	3.00	Engineering	Neutral	Agree	Agree	Agree	Neutral	Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
4	4.00	Engineering	Agree	Agree	Agree	Strongly Agree	Agree	Strongly Agree	Neutral	Agree	Agree	Agree	Agree	Strongly Agree
5	5.00	Engineering	Agree	Agree	Neutral	Agree	Agree	Agree	Agree	Neutral	Neutral	Agree	Agree	
6	6.00	Non-Engineering	Agree	Agree	Agree	Agree	Strongly Agree	Agree	Agree	Neutral	Agree	Agree	Agree	
7	7.00	Engineering	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
8	8.00	Engineering	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	
9	9.00	Engineering	Agree	Strongly Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree	Agree	Agree	
10	10.00	Engineering	Neutral	Neutral	Agree	Agree	Agree	Agree	Neutral	Agree	Agree	Agree	Agree	
11	11.00	Non-Engineering	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	
12	12.00	Engineering	Agree	Strongly Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	
13	13.00	Engineering	Agree	Strongly Agree	Agree	Neutral	Agree	Strongly Agree	Strongly Agree	Neutral	Agree	Agree	Agree	
14	14.00	Engineering	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Strongly Agree	Neutral	Strongly Agree	Strongly Agree
15	15.00	Non-Engineering	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	
16	16.00	Engineering	Neutral	Agree	Agree	Neutral	Disagree	Neutral	Agree	Disagree	Agree	Agree	Agree	
17	17.00	Engineering	Neutral	Disagree	Agree	Agree	Agree	Agree	Agree	Agree	Neutral	Agree	Agree	
18	18.00	Engineering	Neutral	Agree	Agree	Neutral	Agree	Agree	Agree	Agree	Agree	Agree	Agree	
19	19.00	Non-Engineering	Agree	Disagree	Strongly Agree	Agree	Agree	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Strongly Agree
20	20.00	Engineering	Agree	Agree	Agree	Agree	Neutral	Strongly Agree	Strongly Agree	Disagree	Neutral	Agree	Agree	
21	21.00	Non-Engineering	Neutral	Agree	Neutral	Agree	Disagree	Agree	Agree	Agree	Disagree	Agree	Agree	
22	22.00	Engineering	Agree	Agree	Neutral	Neutral	Disagree	Agree	Neutral	Neutral	Disagree	Agree	Agree	Strongly Agree
23	23.00	Engineering	Disagree	Disagree	Agree	Strongly Agree	Disagree	Agree	Agree	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree

Data View Variable View

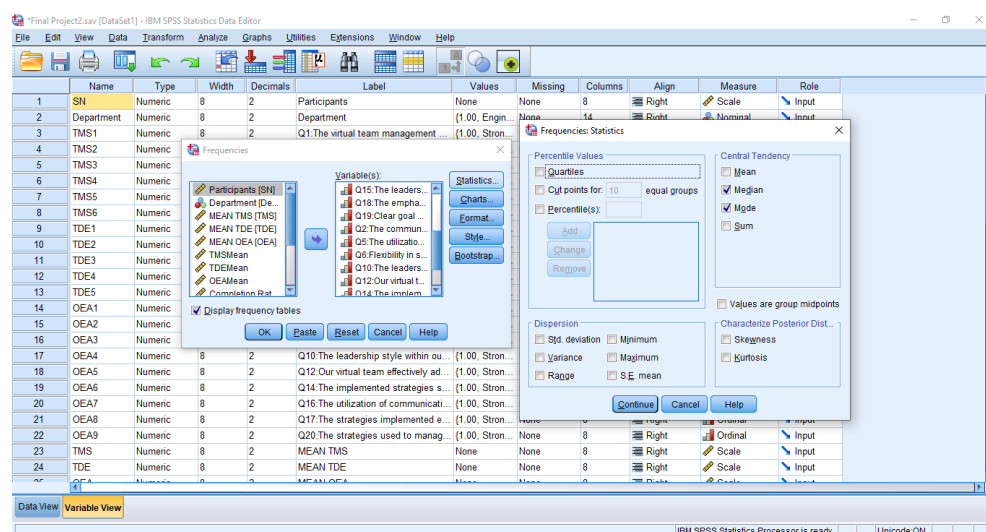
Step3: Analyze > Descriptive Statistics > Frequencies.



Step4: Add all Ordinal Data for Likert questions to Variables.



Step5: in Statistics > check only Median and Mode > press continue > press OK.



SPSS output and analysis

Frequencies

		Statistics																
		Q1: The virtual team management strategies implemented in our organization are effectively aligned with our project goals.	Q2: The defined roles and responsibilities within our virtual team are clear and contribute to successful project completion.	Q3: Regular evaluation and adaptation of our virtual team management strategies positively impact our project completion.	Q4: Trust and accountability are promoted within our virtual team, positively impacting our project outcomes.	Q5: The virtual team management strategies used in our organization effectively address and overcome barriers hindering project completion.	Q6: Cultural sensitivity and inclusivity within our virtual team fosters a conducive environment for achieving successful project outcomes.	Q7: Regular reviews and updates of virtual team management strategies contribute significantly to improved project outcomes.	Q8: Trust and accountability are promoted within our virtual team, positively impacting our project outcomes.	Q9: The leadership style within our virtual team fosters a conducive environment for achieving successful project outcomes.	Q10: The emphasis on trust and accountability within our virtual team positively impacts our project completion rates.	Q11: Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team.	Q12: The communication channels utilized within our virtual team effectively facilitate project progress and completion.	Q13: The utilization of technology tools within our virtual team significantly enhances our ability to collaborate and complete projects efficiently.	Q14: Flexibility in scheduling and adapting to time zone differences contributes to our project completion rates.	Q15: The leadership style within our virtual team significantly influences our project completion rates.	Q16: Our virtual team effectively adapts to changing project requirements, positively influencing project completion rates.	
N	Valid	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Median	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
	Mode	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

Statistics																
Analysis of Sentiment	Q9: The virtual team management strategies used in our organization effectively address and overcome communication barriers hindering project completion.	Q11: The virtual team management strategies implemented have enhanced overall team collaboration and synergy in achieving project goals.	Q13: Regular reviews and updates of virtual team management strategies contribute significantly to improved project outcomes.	Q4: Trust and accountability are promoted within our virtual team, positively impacting our project outcomes.	Q8: Cultural sensitivity and inclusivity within our virtual team fosters a conducive environment for achieving successful project outcomes.	Q15: The leadership style within our virtual team positively impacts our project completion rates.	Q18: The emphasis on trust and accountability within our virtual team effectively impacts our project outcomes.	Q19: Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team.	Q22: The communication channels utilized within our virtual team significantly facilitate project completion.	Q5: The utilization of technology tools within our virtual team significantly enhances our ability to collaborate and complete projects efficiently.	Q6: Flexibility in scheduling and adapting to time zone differences effectively contributes to our project completion rates.	Q10: The leadership style within our virtual team significantly influences our project completion rates.	Q14: The implemented strategies sufficiently address challenges arising from cultural diversity within the virtual team, positively impacting project completion.	Q17: The strategies implemented effectively address and mitigate technology-related challenges, positively influencing project completion rates.	Q20: The strategies used to manage time zone differences significantly contribute to successful project completion within our virtual team.	
	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000
	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00

The Median and Mode have been given for each Likert item respectively. There are no missing items in the sample of N=95 participants.

As a results from Likert questions, the SPSS shows that Median=4 & Mode=4 for all Likert items which means that the majority of participants agreed that virtual team strategies have positive impact on the project completion.

2) Percent Frequency Distribution

Another approach is to check the percent frequency distribution for each Likert question.

Q1: The virtual team management strategies implemented in our organization are effectively aligned with our project goals.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	6	6.3	6.3	7.4
	Neutral	22	23.2	23.2	30.5
	Agree	49	51.6	51.6	82.1
	Strongly Agree	17	17.9	17.9	100.0
	Total	95	100.0	100.0	

The data has been summarized the distribution of responses for question Q1 ("The virtual team management strategies implemented in our organization are effectively aligned with our project goals") based on the percentages of responses within different categories:

- **Strongly Disagree:** 1.1% of the population.
- **Disagree:** 6.3% of the population.
- **Neutral ("Neither agree nor disagree"):** 23.2% of the population.
- **Agree:** 51.6% of the population (which is the majority).
- **Strongly Agree:** 17.9% of the population.

This breakdown provides an overview of how respondents in this question perceive the alignment of virtual team management strategies with project goals. The majority of respondents (51.6%) agree that the strategies are effectively aligned, while a significant portion (23.2%) remains neutral on the statement. There are also percentages indicating disagreement (6.3%), strong disagreement (1.1%), and strong agreement (17.9%). This breakdown helps understand the distribution of opinions regarding this aspect of virtual team management.

Q3: The defined roles and responsibilities within our virtual team are clear and contribute to successful project completion					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	13	13.7	13.7	18.9
	Agree	55	57.9	57.9	76.8
	Strongly Agree	22	23.2	23.2	100.0
	Total	95	100.0	100.0	

This table presents the distribution and percentages of responses regarding the clarity of roles and responsibilities within the virtual team contributing to successful project completion:

- **Strongly Disagree:** Represents 1.1% of the responses, indicating a very small proportion strongly disagreeing with the statement.
- **Disagree:** Accounts for 4.2% of responses, reflecting a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 13.7% of responses, indicating a significant portion of participants expressing neutrality or indecision regarding the clarity of roles and their impact on project success.
- **Agree:** Represents the majority with 57.9% of responses, signifying a substantial agreement that clear roles contribute positively to project completion.
- **Strongly Agree:** Accounts for 23.2% of responses, indicating a sizable proportion strongly endorsing the idea that well-defined roles and responsibilities are crucial for successful project completion.

Overall, the majority of participants (81.1% - Agree and Strongly Agree combined) affirm the significance of clear roles and responsibilities in driving successful project completion within the virtual team environment.

Q7:Regular evaluation and adaptation of our virtual team management strategies positively impact our project completion.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.2	3.2	3.2
	Disagree	4	4.2	4.2	7.4
	Neutral	11	11.6	11.6	18.9
	Agree	50	52.6	52.6	71.6
	Strongly Agree	27	28.4	28.4	100.0
	Total	95	100.0	100.0	

This table illustrates the distribution and percentages of responses related to the impact of regular evaluation and adaptation of virtual team management strategies on project completion:

- **Strongly Disagree:** Represents 3.2% of responses, indicating a small fraction strongly disagreeing with the notion that evaluation and adaptation impact project completion.
- **Disagree:** Accounts for 4.2% of responses, reflecting a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 11.6% of responses, indicating a considerable portion expressing neutrality or uncertainty regarding the positive impact of evaluation and adaptation on project completion.
- **Agree:** Represents the majority with 52.6% of responses, signifying a substantial agreement that regular evaluation and adaptation positively influence project completion.
- **Strongly Agree:** Accounts for 28.4% of responses, indicating a significant proportion strongly endorsing the idea that proactive evaluation and adaptation significantly contribute to successful project completion.

Overall, a notable majority (81% - Agree and Strongly Agree combined) of participants acknowledge the positive impact of regular evaluation and adaptation of virtual team management strategies on enhancing project completion within the organizational environment.

Q9: The virtual team management strategies used in our organization effectively address and overcome communication barriers hindering project completion.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	5	5.3	5.3	6.3
	Neutral	15	15.8	15.8	22.1
	Agree	55	57.9	57.9	80.0
	Strongly Agree	19	20.0	20.0	100.0
	Total	95	100.0	100.0	

This table presents the distribution and percentages of responses concerning the effectiveness of virtual team management strategies in addressing communication barriers hindering project completion:

- **Strongly Disagree:** Represents 1.1% of responses, indicating a very small fraction strongly disagreeing with the effectiveness of strategies in overcoming communication barriers.
- **Disagree:** Accounts for 5.3% of responses, reflecting a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 15.8% of responses, indicating a substantial portion expressing neutrality or uncertainty regarding the effectiveness of strategies in addressing communication barriers.
- **Agree:** Represents the majority with 57.9% of responses, signifying a significant agreement that the strategies effectively address and overcome communication barriers impacting project completion.
- **Strongly Agree:** Accounts for 20.0% of responses, indicating a notable proportion strongly endorsing the effectiveness of strategies in overcoming communication barriers.

Overall, a substantial majority (78.0% - Agree and Strongly Agree combined) of participants acknowledge the efficacy of virtual team management strategies in addressing communication barriers that hinder project completion within the organizational environment.

Q11: The virtual team management strategies implemented have enhanced overall team collaboration and synergy in achieving project goals.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	5.3	5.3	5.3
	Neutral	11	11.6	11.6	16.8
	Agree	54	56.8	56.8	73.7
	Strongly Agree	25	26.3	26.3	100.0
	Total	95	100.0	100.0	

This table represents the distribution and percentages of responses regarding the impact of virtual team management strategies on enhancing team collaboration and synergy in achieving project goals:

- **Disagree:** Accounts for 5.3% of responses, indicating a small percentage in disagreement regarding the strategies' enhancement of team collaboration and synergy.
- **Neutral:** Comprises 11.6% of responses, signifying a portion expressing neutrality or uncertainty regarding the strategies' impact on team collaboration.
- **Agree:** Represents a substantial majority with 56.8% of responses, indicating a significant agreement that the implemented strategies have positively enhanced team collaboration and synergy.
- **Strongly Agree:** Accounts for 26.3% of responses, showing a notable proportion strongly endorsing the idea that the strategies have significantly improved team collaboration and synergy in achieving project goals.

Overall, a considerable majority (83.1% - Agree and Strongly Agree combined) of participants affirm that the implemented virtual team management strategies have positively contributed to enhancing overall team collaboration and synergy towards achieving project goals.

Q13:Regular reviews and updates of virtual team management strategies contribute significantly to improved project outcomes.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.1	2.1	2.1
	Disagree	5	5.3	5.3	7.4
	Neutral	7	7.4	7.4	14.7
	Agree	57	60.0	60.0	74.7
	Strongly Agree	24	25.3	25.3	100.0
	Total	95	100.0	100.0	

This table exhibits the distribution and percentages of responses concerning the impact of regular reviews and updates of virtual team management strategies on improved project outcomes:

- **Strongly Disagree:** Represents 2.1% of responses, indicating a small fraction strongly disagreeing with the notion that reviews and updates significantly contribute to improved project outcomes.
- **Disagree:** Accounts for 5.3% of responses, indicating a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 7.4% of responses, indicating a portion expressing neutrality or uncertainty regarding the contribution of reviews and updates to project outcomes.
- **Agree:** Represents the majority with 60.0% of responses, signifying a significant agreement that regular reviews and updates contribute significantly to improved project outcomes.
- **Strongly Agree:** Accounts for 25.3% of responses, indicating a notable proportion strongly endorsing the idea that reviews and updates play a substantial role in enhancing project outcomes.

In summary, a substantial majority (85.3% - Agree and Strongly Agree combined) of participants acknowledge the substantial contribution of regular reviews and updates of virtual team management strategies toward improving project outcomes.

Q4: Trust and accountability are promoted within our virtual team, positively impacting our project outcomes					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	14	14.7	14.7	20.0
	Agree	46	48.4	48.4	68.4
	Strongly Agree	30	31.6	31.6	100.0
	Total	95	100.0	100.0	

This table represents the distribution and percentages of responses concerning the promotion of trust and accountability within virtual teams, impacting project outcomes:

- **Strongly Disagree:** Represents 1.1% of responses, indicating a very small fraction strongly disagreeing with the notion that trust and accountability positively impact project outcomes.
- **Disagree:** Accounts for 4.2% of responses, indicating a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 14.7% of responses, indicating a portion expressing neutrality or uncertainty regarding the impact of trust and accountability on project outcomes.
- **Agree:** Represents a significant portion with 48.4% of responses, signifying a notable agreement that the promotion of trust and accountability positively influences project outcomes.
- **Strongly Agree:** Accounts for 31.6% of responses, indicating a considerable proportion strongly endorsing the idea that fostering trust and accountability significantly impacts project outcomes.

Overall, a substantial majority (80.0% - Agree and Strongly Agree combined) of participants acknowledge the positive impact of promoting trust and accountability within virtual teams on the outcomes of projects.

Q8: Cultural sensitivity and inclusivity within our virtual team environment positively affect our project outcomes					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.1	2.1	2.1
	Disagree	7	7.4	7.4	9.5
	Neutral	19	20.0	20.0	29.5
	Agree	47	49.5	49.5	78.9
	Strongly Agree	20	21.1	21.1	100.0
	Total	95	100.0	100.0	

This table displays the distribution and percentages of responses regarding cultural sensitivity and inclusivity within the virtual team environment, and its impact on project outcomes:

- **Strongly Disagree:** Represents 2.1% of responses, indicating a small fraction strongly disagreeing with the idea that cultural sensitivity and inclusivity positively affect project outcomes.
- **Disagree:** Accounts for 7.4% of responses, reflecting a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 20.0% of responses, indicating a significant portion expressing neutrality or uncertainty regarding the impact of cultural sensitivity and inclusivity on project outcomes.
- **Agree:** Represents a substantial portion with 49.5% of responses, signifying a notable agreement that cultural sensitivity and inclusivity positively affect project outcomes.
- **Strongly Agree:** Accounts for 21.1% of responses, indicating a considerable proportion strongly endorsing the idea that cultural sensitivity and inclusivity have a positive impact on project outcomes.

In summary, a significant majority (70.6% - Agree and Strongly Agree combined) of participants recognize the positive influence of cultural sensitivity and inclusivity within the virtual team environment on the outcomes of projects.

Q15: The leadership style within our virtual team fosters a conducive environment for achieving successful project outcomes.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	5	5.3	5.3	6.3
	Neutral	10	10.5	10.5	16.8
	Agree	54	56.8	56.8	73.7
	Strongly Agree	25	26.3	26.3	100.0
	Total	95	100.0	100.0	

This table illustrates the distribution and percentages of responses concerning the impact of leadership style within virtual teams on achieving successful project outcomes:

- **Strongly Disagree:** Represents 1.1% of responses, indicating a very small fraction strongly disagreeing with the notion that the leadership style contributes to successful project outcomes.
- **Disagree:** Accounts for 5.3% of responses, indicating a slightly higher but still relatively low percentage in disagreement.
- **Neutral:** Comprises 10.5% of responses, indicating a portion expressing neutrality or uncertainty regarding the influence of leadership style on project outcomes.
- **Agree:** Represents a significant portion with 56.8% of responses, signifying a notable agreement that the leadership style fosters a conducive environment for achieving successful project outcomes.
- **Strongly Agree:** Accounts for 26.3% of responses, indicating a considerable proportion strongly endorsing the idea that the leadership style significantly contributes to successful project outcomes.

In summary, a substantial majority (83.1% - Agree and Strongly Agree combined) of participants acknowledge the positive influence of leadership style within virtual teams on achieving successful project outcomes.

Q18: The emphasis on trust and accountability within our virtual team positively impacts our project outcomes.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	2	2.1	2.1	3.2
	Neutral	13	13.7	13.7	16.8
	Agree	58	61.1	61.1	77.9
	Strongly Agree	21	22.1	22.1	100.0
	Total	95	100.0	100.0	

The data table presents responses related to the impact of emphasizing trust and accountability within virtual teams on project outcomes:

- **Strongly Disagree:** Represents 1.1% of responses, indicating a very small fraction strongly disagreeing that emphasizing trust and accountability positively impacts project outcomes.
- **Disagree:** Accounts for 2.1% of responses, indicating a slightly higher but still limited percentage in disagreement.
- **Neutral:** Comprises 13.7% of responses, indicating a portion expressing neutrality or uncertainty regarding the influence of emphasizing trust and accountability on project outcomes.
- **Agree:** Represents a significant portion with 61.1% of responses, signifying a notable agreement that emphasizing trust and accountability positively impacts project outcomes.
- **Strongly Agree:** Accounts for 22.1% of responses, indicating a considerable proportion strongly endorsing the idea that emphasizing trust and accountability has a positive impact on project outcomes.

In summary, a substantial majority (83.2% - Agree and Strongly Agree combined) of participants recognize the positive influence of emphasizing trust and accountability within virtual teams on project outcomes.

Q19:Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.1	2.1	2.1
	Neutral	4	4.2	4.2	6.3
	Agree	53	55.8	55.8	62.1
	Strongly Agree	36	37.9	37.9	100.0
	Total	95	100.0	100.0	

This table represents responses concerning the impact of clear goal setting and objective alignment on the successful completion of projects within virtual teams:

- **Disagree:** Accounts for a minimal percentage of 2.1% of responses, indicating a small fraction in disagreement with the notion that clear goal setting and objective alignment contribute to project success.
- **Neutral:** Comprises 4.2% of responses, indicating a small portion expressing neutrality or uncertainty regarding the influence of goal setting and alignment on project success.
- **Agree:** Represents a significant portion with 55.8% of responses, signifying a notable agreement that clear goal setting and objective alignment contribute to the successful completion of projects.
- **Strongly Agree:** Accounts for 37.9% of responses, indicating a substantial proportion strongly endorsing the idea that clear goal setting and alignment significantly contributes to project success within virtual teams.

In summary, a considerable majority (93.7% - Agree and Strongly Agree combined) of participants acknowledge the positive influence of clear goal setting and objective alignment on the successful completion of projects within virtual teams.

Q2:The communication channels utilized within our virtual team effectively facilitate project progress and completion					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.2	3.2	3.2
	Disagree	3	3.2	3.2	6.3
	Neutral	9	9.5	9.5	15.8
	Agree	60	63.2	63.2	78.9
	Strongly Agree	20	21.1	21.1	100.0
	Total	95	100.0	100.0	

This data table illustrates the responses related to the effectiveness of communication channels in facilitating project progress and completion within virtual teams:

- **Strongly Disagree & Disagree:** These categories together account for a small proportion, totaling 6.3% of responses, expressing disagreement with the notion that the utilized communication channels effectively facilitate project progress.
- **Neutral:** Represents 9.5% of responses, indicating a fraction with a neutral stance or uncertainty about the effectiveness of communication channels in project facilitation.
- **Agree:** Forms the majority, comprising 63.2% of responses, indicating a substantial agreement that the communication channels effectively aid project progress within virtual teams.
- **Strongly Agree:** Represents 21.1% of responses, signifying a notable portion strongly endorsing the effectiveness of communication channels in facilitating project progress and completion.

In summary, the majority of participants (84.3% - Agree and Strongly Agree combined) acknowledge that the communication channels utilized within their virtual teams effectively contribute to project progress and successful completion.

Q5: The utilization of technology tools within our virtual team significantly enhances our ability to collaborate and complete projects efficiently					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	5	5.3	5.3	10.5
	Agree	47	49.5	49.5	60.0
	Strongly Agree	38	40.0	40.0	100.0
	Total	95	100.0	100.0	

This data table summarizes responses related to the impact of technology tools on collaboration and project efficiency within virtual teams:

- **Strongly Disagree & Disagree:** Combined, these categories represent 5.3% of responses, indicating a minimal percentage that disagrees with the notion that technology tools enhance collaboration and project efficiency.
- **Neutral:** Represents 5.3% of responses, reflecting a small portion with a neutral stance regarding the impact of technology tools on collaboration and project efficiency.
- **Agree:** Constitutes a substantial portion, at 49.5%, signaling a significant agreement that technology tools enhance collaboration and contribute to project efficiency within virtual teams.
- **Strongly Agree:** Accounts for 40.0% of responses, reflecting a substantial agreement among respondents who strongly believe that technology tools significantly enhance collaboration and project efficiency.

In essence, a majority of respondents (89.5% - Agree and Strongly Agree combined) acknowledge the positive impact of technology tools in improving collaboration and project efficiency within their virtual teams.

Q6:Flexibility in scheduling and adapting to time zone differences effectively contributes to our project completion rates					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	11	11.6	11.6	16.8
	Agree	50	52.6	52.6	69.5
	Strongly Agree	29	30.5	30.5	100.0
	Total	95	100.0	100.0	

This data presents responses related to the impact of scheduling flexibility and time zone adaptability on project completion rates within virtual teams:

- **Strongly Disagree & Disagree:** These categories represent a small portion, totaling 5.3% of responses, indicating a minimal disagreement with the idea that scheduling flexibility affects project completion rates positively.
- **Neutral:** Constitutes 11.6% of responses, reflecting a modest portion of respondents who hold a neutral stance regarding the impact of scheduling flexibility and time zone adaptability on project completion rates.
- **Agree:** Represents a significant portion, with 52.6% of responses, signaling a considerable agreement that scheduling flexibility contributes positively to project completion rates within virtual teams.
- **Strongly Agree:** Accounts for 30.5% of responses, indicating a substantial agreement among respondents who strongly believe in the positive impact of scheduling flexibility and time zone adaptability on project completion rates.

In summary, a majority of respondents (83.1% - Agree and Strongly Agree combined) acknowledge the positive contribution of scheduling flexibility and time zone adaptability to project completion rates within their virtual teams.

Q10: The leadership style within our virtual team significantly influences our project completion rates.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.1	2.1	2.1
	Disagree	2	2.1	2.1	4.2
	Neutral	10	10.5	10.5	14.7
	Agree	52	54.7	54.7	69.5
	Strongly Agree	29	30.5	30.5	100.0
	Total	95	100.0	100.0	

This data illustrates responses pertaining to the impact of leadership styles within virtual teams on project completion rates:

- **Strongly Disagree & Disagree:** These categories together account for 4.2% of responses, signifying a minimal disagreement with the notion that leadership style significantly influences project completion rates.
- **Neutral:** Represents 10.5% of responses, indicating a moderate portion of respondents who hold a neutral stance concerning the influence of leadership style on project completion rates within virtual teams.
- **Agree:** Constitutes the majority with 54.7% of responses, showcasing a substantial agreement regarding the influence of leadership style on project completion rates.
- **Strongly Agree:** Represents 30.5% of responses, indicating a significant number of respondents who strongly believe in the considerable influence of leadership style on project completion rates.

In summary, a majority of participants (85.2% - Agree and Strongly Agree combined) perceive that the leadership style within virtual teams significantly impacts project completion rates.

Q12:Our virtual team effectively adapts to changing project requirements, positively influencing project completion rates.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	16	16.8	16.8	22.1
	Agree	53	55.8	55.8	77.9
	Strongly Agree	21	22.1	22.1	100.0
	Total	95	100.0	100.0	

This data reflects responses regarding the adaptability of virtual teams to changing project requirements and its impact on project completion rates:

- **Strongly Disagree & Disagree:** These categories combined account for 5.3% of responses, indicating a small disagreement regarding the effectiveness of the virtual team in adapting to changing project requirements to positively influence project completion rates.
- **Neutral:** Represents 16.8% of responses, indicating a moderate portion of respondents who hold a neutral stance regarding the adaptability of virtual teams and its impact on project completion rates.
- **Agree:** Constitutes the majority with 55.8% of responses, signifying a substantial agreement about the positive influence of the team's adaptability on project completion rates.
- **Strongly Agree:** Represents 22.1% of responses, indicating a significant number of respondents strongly believe in the positive impact of the team's adaptability on project completion rates.

In summary, a majority of participants (78.9% - Agree and Strongly Agree combined) perceive that the effectiveness of virtual teams in adapting to changing project requirements significantly influences project completion rates.

Q14: The implemented strategies sufficiently address challenges arising from cultural diversity within the virtual team, positively impacting project completion.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	4.2	4.2	4.2
	Neutral	24	25.3	25.3	29.5
	Agree	53	55.8	55.8	85.3
	Strongly Agree	14	14.7	14.7	100.0
	Total	95	100.0	100.0	

The responses regarding strategies addressing challenges from cultural diversity within virtual teams and their impact on project completion rates are depicted in this data:

- **Disagree:** Represents 4.2% of responses, indicating a small percentage of participants who disagree that the strategies adequately tackle challenges from cultural diversity within virtual teams to positively impact project completion.
- **Neutral:** Accounts for 25.3% of responses, indicating a significant portion of respondents who hold a neutral stance on whether these strategies sufficiently address cultural diversity challenges to impact project completion.
- **Agree:** Constitutes a majority with 55.8% of responses, signifying a substantial agreement that the implemented strategies effectively handle cultural diversity challenges within virtual teams, positively impacting project completion.
- **Strongly Agree:** Represents 14.7% of responses, indicating a notable percentage of participants strongly believe in the positive impact of these strategies on project completion amidst cultural diversity challenges.

In summary, a majority of participants (70.5% - Agree and Strongly Agree combined) acknowledge that the strategies effectively address challenges arising from cultural diversity within virtual teams, thereby positively impacting project completion.

Q16: The utilization of communication platforms within our virtual team significantly influences the efficiency of project completion					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.1	2.1	2.1
	Neutral	8	8.4	8.4	10.5
	Agree	53	55.8	55.8	66.3
	Strongly Agree	32	33.7	33.7	100.0
	Total	95	100.0	100.0	

The responses regarding the impact of utilizing communication platforms within virtual teams on the efficiency of project completion are outlined in this data:

- **Disagree:** Represents a minimal 2.1% of responses, indicating a small percentage of participants who disagree that the utilization of communication platforms significantly influences project completion efficiency within virtual teams.
- **Neutral:** Accounts for 8.4% of responses, signifying a modest portion of respondents who hold a neutral stance on whether the usage of communication platforms impacts project completion efficiency in virtual teams.
- **Agree:** Constitutes a substantial majority, with 55.8% of responses, reflecting a significant agreement that the use of communication platforms within virtual teams influences project completion efficiency.
- **Strongly Agree:** Represents a considerable 33.7% of responses, indicating a significant portion of participants strongly believe that utilizing communication platforms significantly influences the efficiency of project completion within virtual teams.

Overall, a majority of participants (89.5% - Agree and Strongly Agree combined) concur that the utilization of communication platforms significantly influences the efficiency of project completion within virtual teams.

Q17:The strategies implemented effectively address and mitigate technology-related challenges, positively influencing project completion rates.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	11	11.6	11.6	16.8
	Agree	59	62.1	62.1	78.9
	Strongly Agree	20	21.1	21.1	100.0
	Total	95	100.0	100.0	

This data reflects responses related to the effectiveness of strategies in addressing technology-related challenges and their impact on project completion rates within virtual teams:

- **Strongly Disagree:** A minimal 1.1% of responses express strong disagreement that the strategies effectively address technology-related challenges and positively influence project completion rates.
- **Disagree:** Represents 4.2% of responses, indicating a small disagreement with the effectiveness of strategies in mitigating technology-related challenges and their impact on project completion rates.
- **Neutral:** Accounts for 11.6% of responses, signifying a modest portion of participants who remain neutral regarding the effectiveness of the strategies in addressing technology-related challenges and their impact on project completion rates.
- **Agree:** Constitutes a substantial majority, with 62.1% of responses, indicating agreement that the strategies effectively address technology-related challenges and positively impact project completion rates.
- **Strongly Agree:** Represents 21.1% of responses, indicating a significant portion of participants strongly believe that strategies effectively mitigate technology-related challenges, positively influencing project completion rates.

Overall, the majority of respondents (83.2% - Agree and Strongly Agree combined) are in agreement that the implemented strategies effectively address technology-related challenges, positively impacting project completion rates within virtual teams.

Q20: The strategies used to manage time zone differences significantly contribute to successful project completion within our virtual team.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.1	1.1	1.1
	Disagree	4	4.2	4.2	5.3
	Neutral	22	23.2	23.2	28.4
	Agree	48	50.5	50.5	78.9
	Strongly Agree	20	21.1	21.1	100.0
	Total	95	100.0	100.0	

The data represents responses regarding strategies used to manage time zone differences and their influence on successful project completion within virtual teams:

- **Strongly Disagree:** Indicates only 1.1% of respondents strongly disagree that the strategies for managing time zone differences contribute to successful project completion within the virtual team.
- **Disagree:** Represents 4.2% of responses, indicating a small disagreement regarding the contribution of time zone management strategies to successful project completion.
- **Neutral:** Accounts for 23.2% of responses, signifying a significant portion of participants who are neutral about the contribution of these strategies to successful project completion.
- **Agree:** Constitutes a substantial majority, with 50.5% of responses, indicating agreement that the strategies employed to manage time zone differences significantly contribute to successful project completion within virtual teams.
- **Strongly Agree:** Represents 21.1% of responses, signifying a considerable proportion of participants strongly believe that time zone management strategies play a crucial role in successful project completion.

Overall, a notable majority (71.6% - Agree and Strongly Agree combined) perceive that the strategies utilized to manage time zone differences significantly contribute to successful project completion within virtual teams.

3) Non-Parametric Analyses:

Using non-parametric analysis, especially when dealing with Likert scale data and a sample size less than 100, becomes crucial due to various reasons:

- **Sample Size:** For parametric tests to apply, the sample size typically needs to be larger than 100, allowing for the assumptions of the central limit theorem to hold true. In this scenario, where the sample size is 95, it doesn't meet the requirement for parametric tests, necessitating the use of non-parametric methods.
- **Distribution Assumption:** Single Likert response items often do not follow a normal distribution. Likert scale data tends to be ordinal rather than truly continuous and may not meet the criteria for normality. In this case, the data's non-normal distribution further supports the utilization of non-parametric tests for more accurate analysis and interpretation.

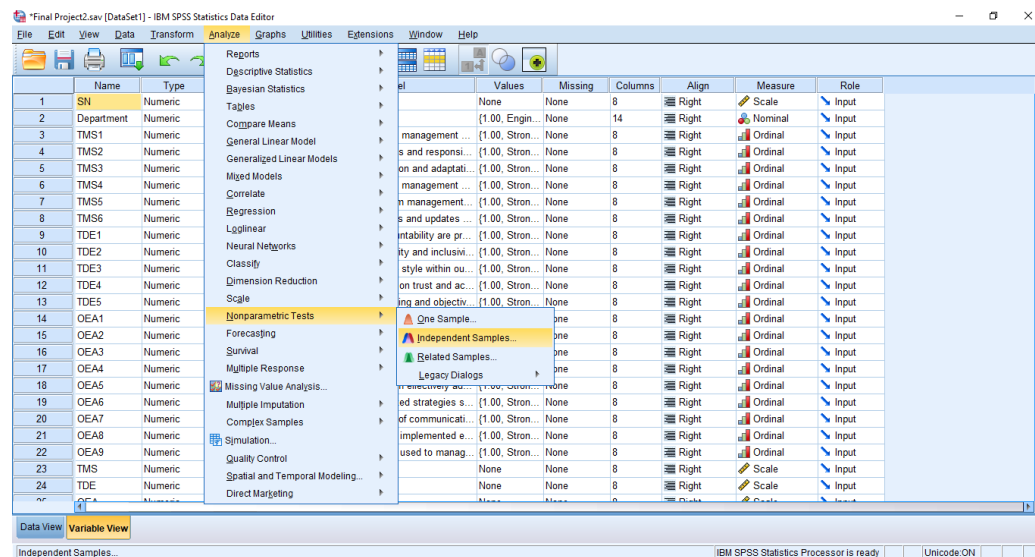
Table 2: Methods of Analysis

Methods of Analysis for Individual Questions (Ordinal Data)		
Graphs	Bar Charts and dot Plots	Not Histograms
Central Tendency	Median and Mode	Not Mean
Variability	Range and Interquartile Range	Not Standard Deviations
Non-parametric (Tests difference between the medians of comparable groups)	Mann-Whitney U Test	
	Wilcoxon Signed – Rank Test	
	Kruskal -Wallis Test	

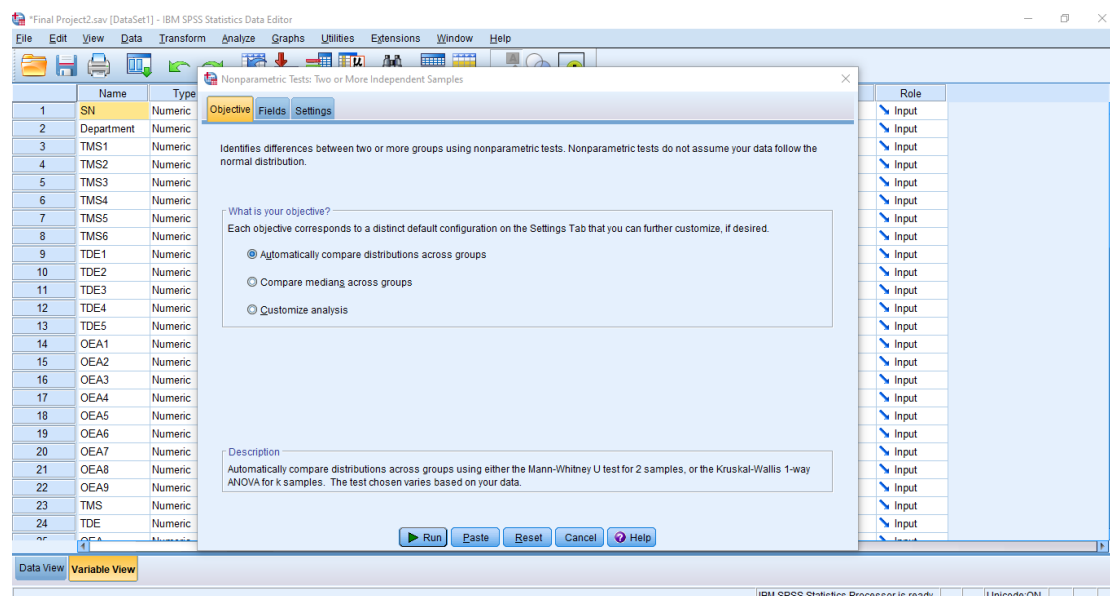
Mann-Whitney U Test:

In this research, the **Mann-Whitney U Test** will be applied to analyze non-parametric ordinal data using SPSS software.

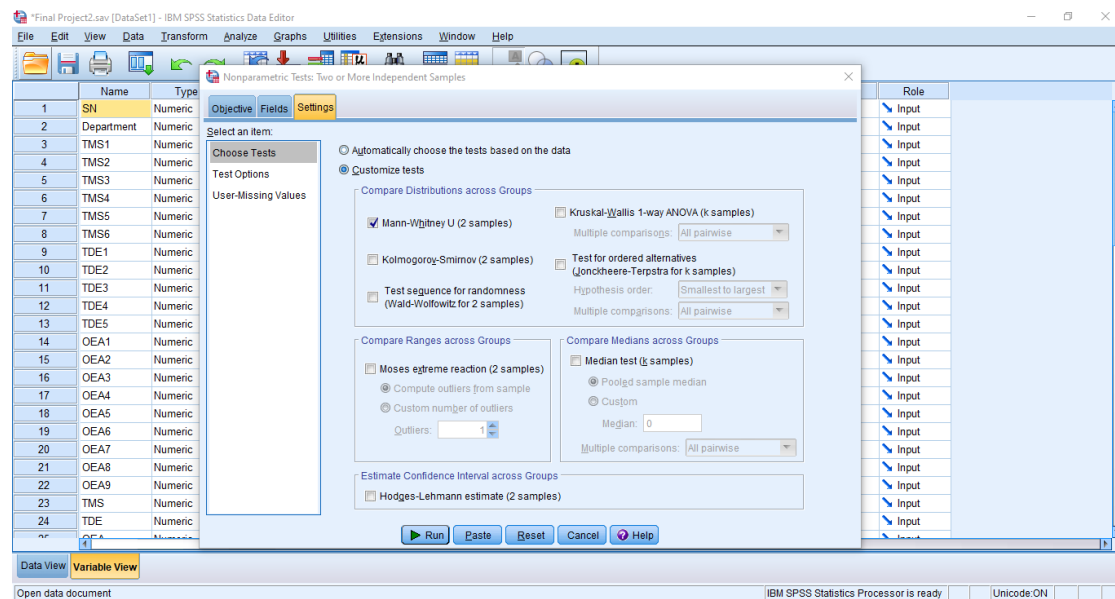
Step1: Analyze > Nonparametric Tests > Independent Samples



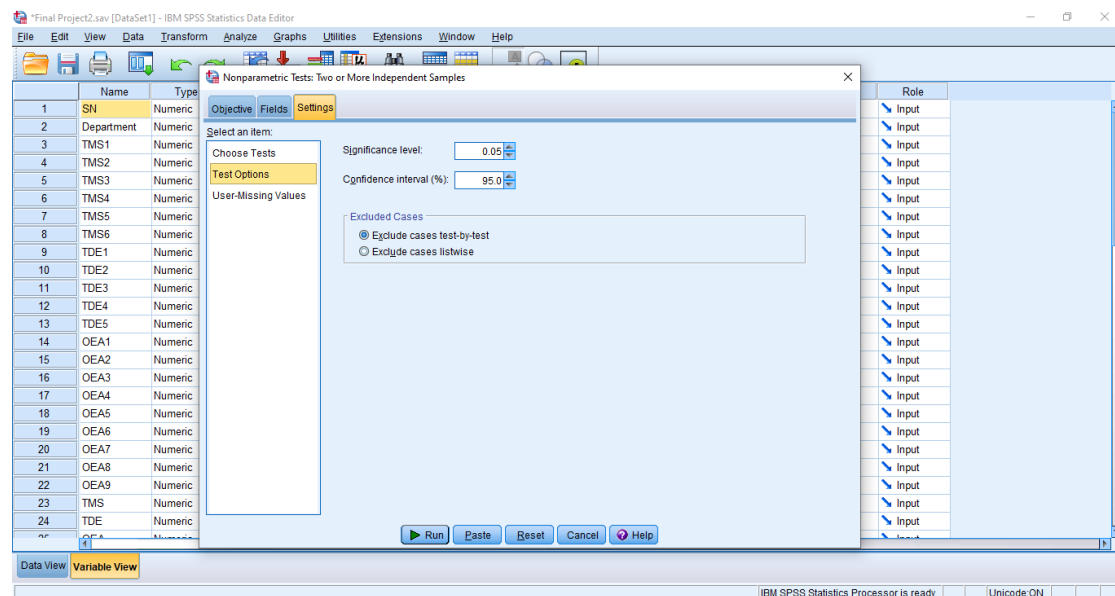
Step2: Independent Samples > Objective > select Automatically compare distribution across groups.



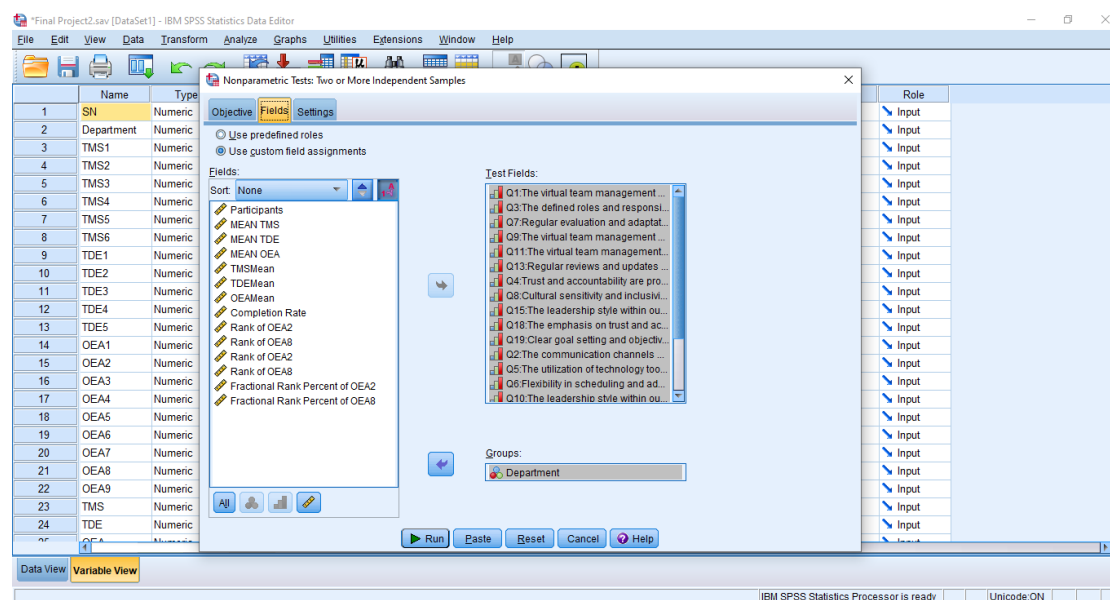
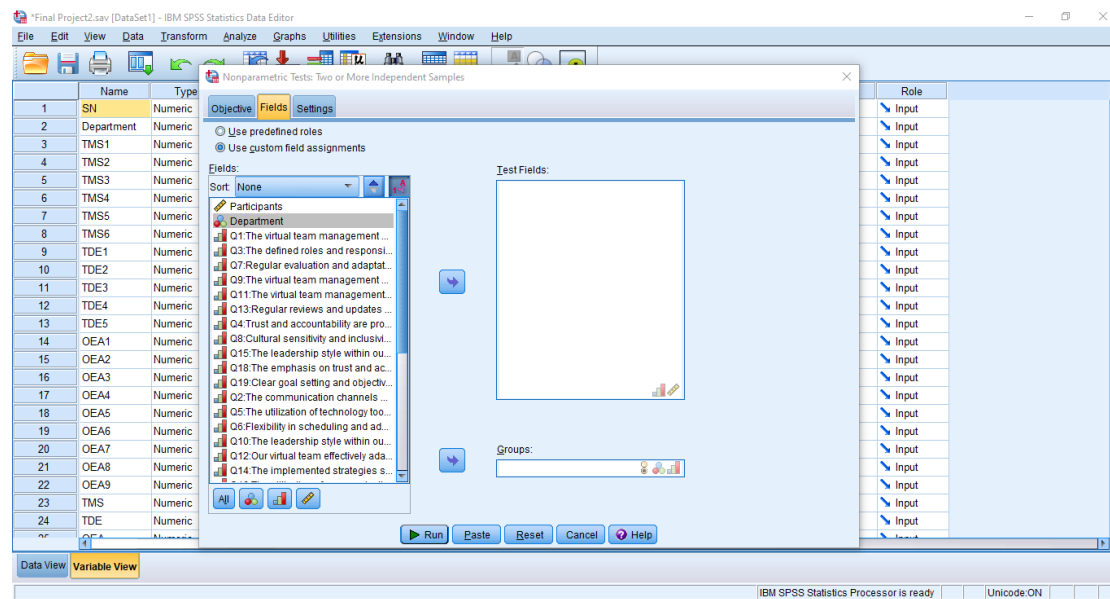
Step3: Settings tab > Choose Tests > Customize tests > check Mann-Whitney U (2 Samples)



Step4: Test Options > Significant level (0.05) and confidence interval (95.0%)



Step5: Add all Likert items to Test Fields, and Add Nominal Department to Groups. Then press Run.



Testing Criteria for Mann-Whitney U Test

If the P-Value exceeds 0.05 ($P\text{-value} > 0.05$), it implies no statistically significant difference between the Engineering and non-Engineering departments participants. Conversely, if the P-Value is less than 0.05 ($P\text{-value} < 0.05$), it indicates a statistically significant difference between these departments.

Following the test results, only Q19 rejects the null hypothesis ($0.01 < 0.05$), while all other questions maintain the null hypothesis.

Independent-Samples Mann-Whitney U Test Summary		Decision
Total N	95	
Mann-Whitney U	479.000	
Wilcoxon W	669.000	
Test Statistic	479.000	
Standard Error	94.432	
Standardized Test Statistic	-2.573	
Asymptotic Sig. (2-sided test)	.010	Reject the null hypothesis

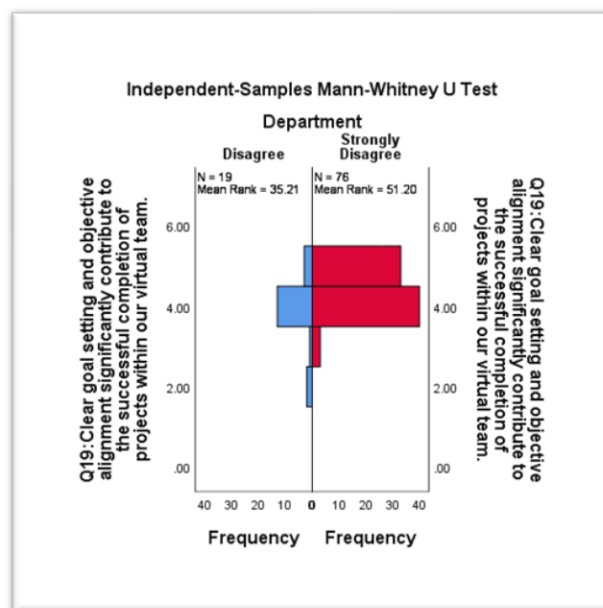


Figure 5: SPSS Independent samples Mann-Whitney U Test

The Mann-Whitney U test conducted for the statement "*Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team*" reveals a statistically significant result.

The obtained p-value of 0.010 (less than 0.05) indicates a significant difference between two groups in their perceptions or responses regarding this statement. This suggests that there's strong evidence to reject the null hypothesis, signifying a notable divergence in opinions or agreement concerning the importance of clear goal setting and alignment for project completion among the surveyed groups.

B. Analysis of Likert Scale using Interval Data

Another way to analyze the Likert Scale data is to classify as interval or scale measure. If the data adheres to parametric properties, fulfilling the conditions for a normal distribution, the ideal analytical method would involve conducting descriptive statistics. This includes calculating parameters like Mean, Standard Deviation, Minimum, and Maximum, providing insights into participants' attitudes, feelings, and behaviors.

The hypothesis testing for interval or scale measures involves employing appropriate analytical methods such as Independent Sample T test, Analysis of Variance (ANOVA), Pearson's correlation, and Regression Analysis. This research will specifically emphasize the examination of standard deviation and Independent Sample T test.

Given that the data is currently in an ordinal format, it's essential to convert it into an interval measure by transforming all Likert scale data into a new variable name. The process involves computing the mean (average) for each of the 20 variables (questions) and transforming them into an interval or scale variable.

To conduct an analysis using descriptive statistics and normality tests in SPSS. This process involves computing means for each variable, then employing Explore under Analyze > Descriptive Statistics in SPSS, using histograms and normality tests.

- **Compute Means in SPSS:**

- ✓ Calculate means for all variables and enter these values into SPSS.

- **Analyzing in SPSS:**

- ✓ Go to Analyze > Descriptive Statistics > Explore in SPSS.
- ✓ Assign these mean values to the dependent lists.
- ✓ In plot settings, deselect stem-and-leaf, opting for Histogram.
- ✓ Select Normally plots and conduct tests.

- **Normality Testing:**

- ✓ For datasets below 100 observations (like N=95 here), Shapiro-Wilk test is suitable for assessing normality.
- ✓ Check the significance values in the output table. If p-values (sig) are below 0.05, it suggests non-normal distribution.

- **Interpreting Non-Normality:**

- ✓ Given the non-normal distribution ($p < 0.05$), relying on Median, Mode, and percentage Frequency Distribution for analysis is advisable.

Non-parametric tests like Mann-Whitney U test, Spearman's correlation, and Kruskal-Wallis test are often used with non-normally distributed data. These are suitable for analyzing Likert scale data and ordinal variables.

3. SPSS steps for Descriptive Statistics:

Step1: Compute the data into one variable. (TotMean)

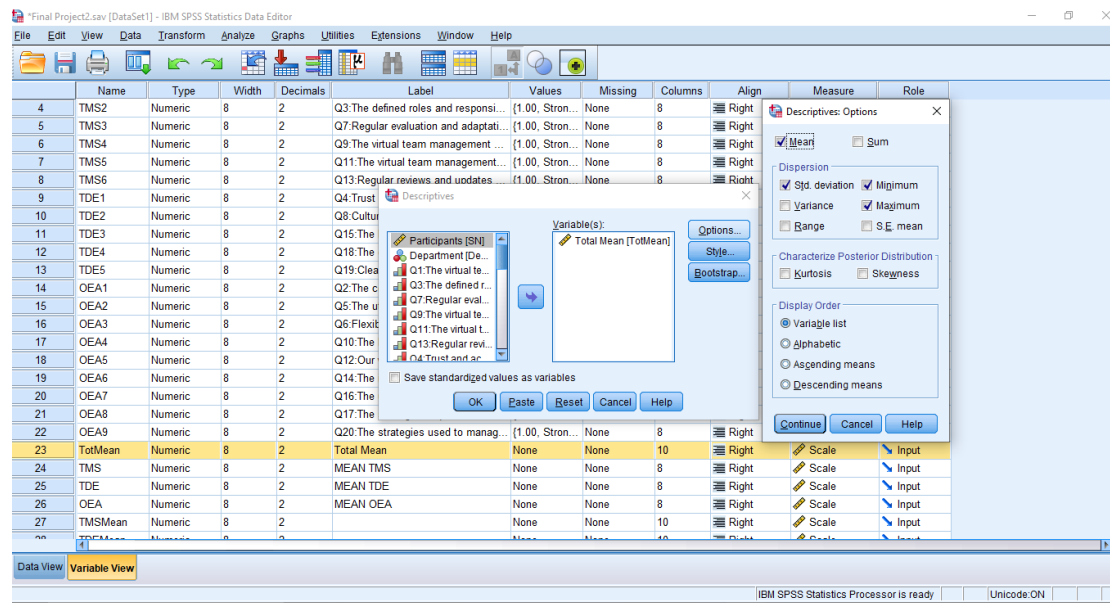
The screenshot shows the IBM SPSS Statistics Data Editor window. The 'Variable View' tab is active, displaying a list of variables. The variable 'TotMean' is highlighted in yellow. The variables are listed in a table with columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role.

Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
TMS2	Numeric	8	2	Q3.The defined roles and responsi...	{1.00, Stron...	None	8	Right	Ordinal	Input
TMS3	Numeric	8	2	Q7.Regular evaluation and adaptati...	{1.00, Stron...	None	8	Right	Ordinal	Input
TMS4	Numeric	8	2	Q9.The virtual team management ...	{1.00, Stron...	None	8	Right	Ordinal	Input
TMS5	Numeric	8	2	Q11.The virtual team management...	{1.00, Stron...	None	8	Right	Ordinal	Input
TMS6	Numeric	8	2	Q13.Regular reviews and updates ...	{1.00, Stron...	None	8	Right	Ordinal	Input
TDE1	Numeric	8	2	Q4.Trust and accountability are pr...	{1.00, Stron...	None	8	Right	Ordinal	Input
TDE2	Numeric	8	2	Q8.Cultural sensitivity and inclusi...	{1.00, Stron...	None	8	Right	Ordinal	Input
TDE3	Numeric	8	2	Q15.The leadership style within ou...	{1.00, Stron...	None	8	Right	Ordinal	Input
TDE4	Numeric	8	2	Q18.The emphasis on trust and ac...	{1.00, Stron...	None	8	Right	Ordinal	Input
TDE5	Numeric	8	2	Q19.Clear goal setting and objectiv...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA1	Numeric	8	2	Q2.The communication channels u...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA2	Numeric	8	2	Q5.The utilization of technology to...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA3	Numeric	8	2	Q6.Flexibility in scheduling and ad...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA4	Numeric	8	2	Q10.The leadership style within ou...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA5	Numeric	8	2	Q12.Our virtual team effectively ad...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA6	Numeric	8	2	Q14.The implemented strategies s...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA7	Numeric	8	2	Q16.The utilization of communicati...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA8	Numeric	8	2	Q17.The strategies implemented e...	{1.00, Stron...	None	8	Right	Ordinal	Input
OEA9	Numeric	8	2	Q20.The strategies used to manag...	{1.00, Stron...	None	8	Right	Ordinal	Input
TotMean	Numeric	8	2	Total Mean	None	None	10	Right	Scale	Input
TMS	Numeric	8	2	MEAN TMS	None	None	8	Right	Scale	Input
TDE	Numeric	8	2	MEAN TDE	None	None	8	Right	Scale	Input
OEA	Numeric	8	2	MEAN OEA	None	None	8	Right	Scale	Input
TMSMean	Numeric	8	2		None	None	10	Right	Scale	Input

Step2: Analyze > Descriptive Statistics > Descriptives.

The screenshot shows the IBM SPSS Statistics Data Editor window with the 'Analyze' menu open. The path 'Analyze > Descriptive Statistics > Descriptives' is highlighted. The 'Descriptives' option is selected. The variable list is visible in the background, with 'TotMean' highlighted in yellow.

Step3: Calculate Mean, Standard Deviation, Maximum, and Minimum.



The SPSS output:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Total Mean	95	2.80	5.00	4.0026	.51666
Valid N (listwise)	95				

This table presents the descriptive statistics for the dataset:

N: The total number of observations in the dataset is 95.

Minimum: The lowest value observed in the dataset is 2.80.

Maximum: The highest value recorded in the dataset is 5.00.

Mean: The average value across all observations is approximately 4.0026.

Standard Deviation: The degree of variation or dispersion around the mean is approximately 0.51666.

The "**Valid N (listwise)**" indicates that all 95 observations have been considered in this analysis. It is required to convert the above value to scale, by calculating the range for the entire scale as a unit.

The interval scale as per Table 3, used in the five-point Likert scale holds significance, particularly in determining the mean. Scores between 1 and 1.8 indicate a strong disagreement. Ranging from 1.9 to 2.6 signifies a disagreement. Values falling between 2.7 and 3.4 represent a neutral stance. Scores spanning from 3.5 to 4.2 indicate agreement, while those between 4.3 and 5 signify a strong agreement.

Table 3: Agreement Scale with Range

Level	Agreement Scale	Range
1	Strongly Disagree (SD)	1-1.8
2	Disagree (D)	1.9-2.6
3	Neutral (NU)	2.7-3.4
4	Agree (A)	3.5-4.2
5	Strongly Agree (SD)	4.3-5.0

This means that the minimum respondent (2.8) is Neutral, the maximum respondent (5.0) is strongly agree. The Mean respondent (4.00) is agree. The standard deviation is (0.51666) less than 1 so it cannot be compared in this scale. However, SD indicates that the dispersion of the respondents from the average of the likeness of the respondents is very small implying that the general likeness of the respondents cluster around the mean value. Hence, it can be convenience to say that the respondents homogeneously agree.

In the event that the Likert data follows a normal distribution, our approach will involve utilizing linear regression and Pearson correlation. Conversely, should the data exhibit non-normal distribution, we'll opt for ordinary regression and Spearman rank correlation as our analytical methods.

Table 4: Parametric & Non-Parametric for Normally Distribution

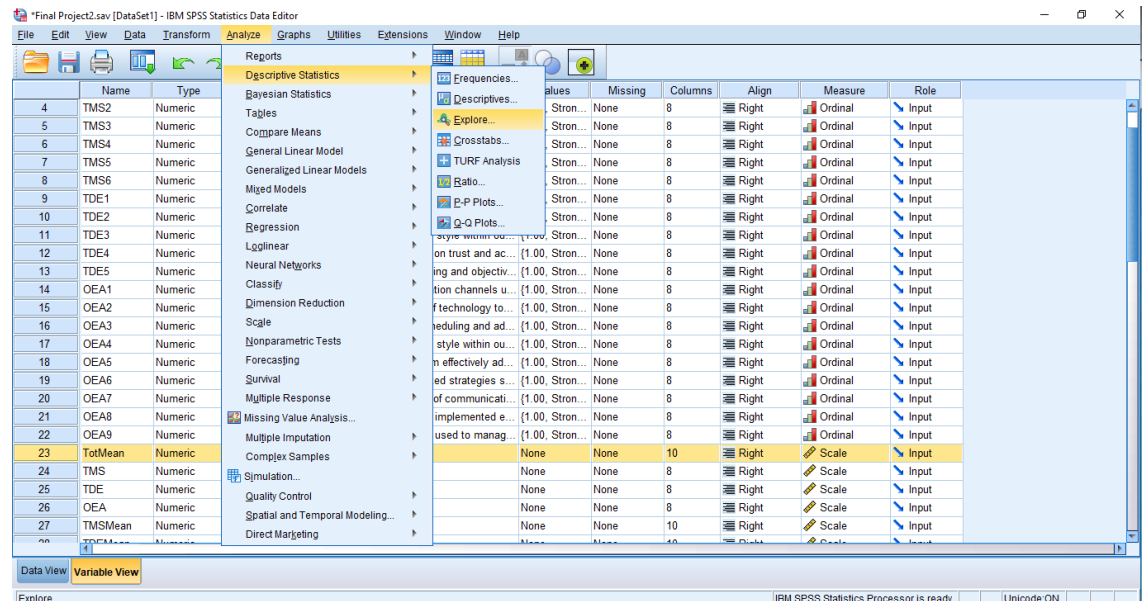
Normally Distributed Likert Scale Data (Parametric method)	NOT Normally Distributed Likert Scale Data (non-parametric method)
Linear Regression	Ordinal Regression
Pearson Correlation	Spearman (Rho) Rank Correlation
T Test	Mann-Whitney U Test
Regression Analysis	Kruskal Wallis Test

In this research study, the focus is on evaluating normality across participants by categorizing them into two distinct groups: individuals affiliated with the Engineering department and those associated with the Non-Engineering department. The examination of normality is conducted using an Independent Sample T test " to compare the Means of two groups".

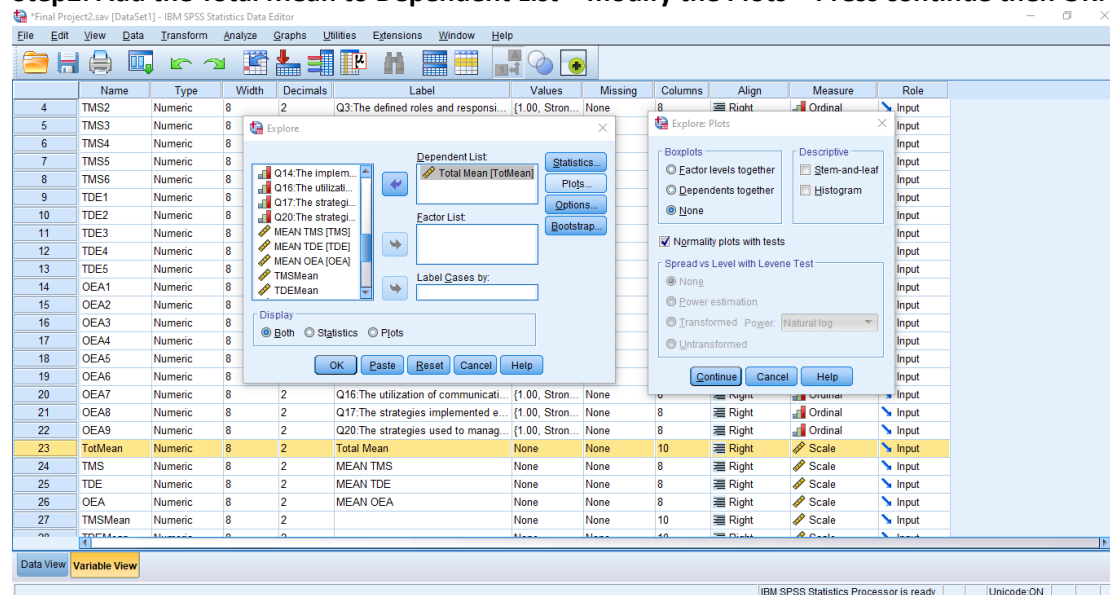
- Null Hypotheses
The distribution of virtual team strategies regardless of additive is the same across all departments.
- Alternative Hypotheses
The distribution of virtual team strategies regardless of additive is NOT the same across all departments.

4. SPSS Steps for Normality Distribution

Step1: Analyze > Descriptive Statistics > Explore.



Step2: Add the Total Mean to Dependent List > modify the Plots > Press continue then OK.



The SPSS output:

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	do	Sig.	Statistic	df	Sig.
Total Mean	.109	95	.007	.971	95	.034
a. Lilliefors Significance Correction						

The provided data represents the results of normality tests conducted on the dataset using Kolmogorov-Smirnov and Shapiro-Wilk tests.

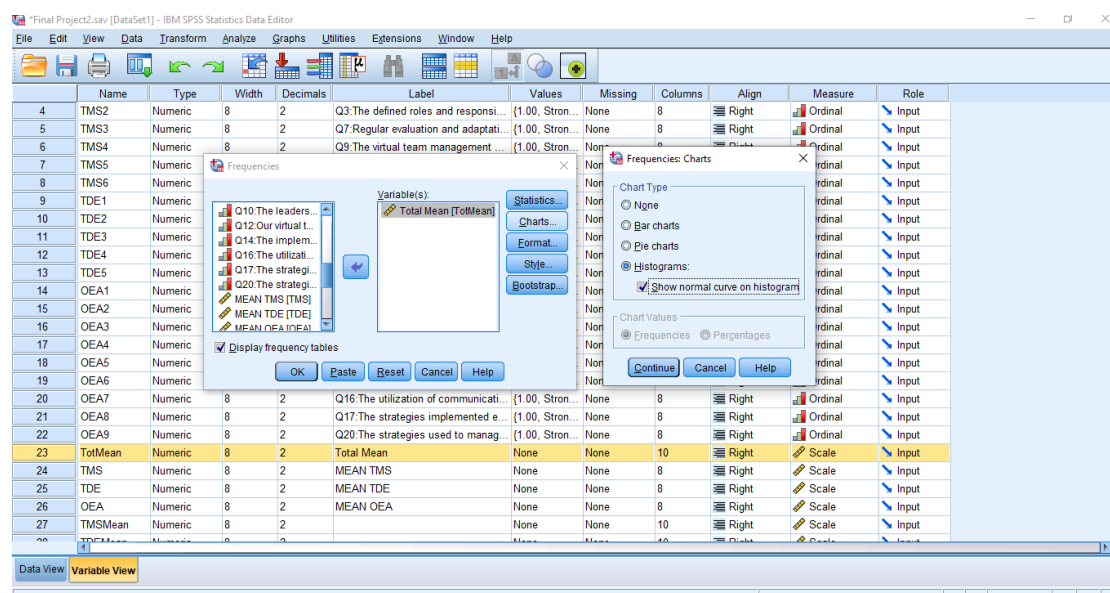
For the Total Mean variable, the Kolmogorov-Smirnov statistic is 0.109 with 95 degrees of freedom, yielding a significance value of 0.007. Simultaneously, the Shapiro-Wilk test statistic for the same variable is 0.971 with 95 degrees of freedom, resulting in a significance level of 0.034 when corrected using Lilliefors Significance Correction.

For smaller datasets, with a sample size of $95 < 100$, the Shapiro-Wilk test is typically used to assess normality. This test is more appropriate for samples with fewer observations compared to the Kolmogorov-Smirnov test. The Shapiro-Wilk test is known for its accuracy in detecting departures from normality, especially with smaller sample sizes.

A Shapiro-Wilk test with a significance value (p-value) less than 0.05 would indicate non-normality in the data. The p-value of 0.034 suggests that the data significantly deviates from a normal distribution. Therefore, the assumption of normality is not met for this dataset.

To show the normality test for **TotMean** (Scale Dataset) in SPSS.

Step1: Analyze > Descriptive Statistics > Frequencies > Add the TotMean to Variable > Open Charts and Check Histograms and show normal curve on histogram> Press OK.



The SPSS Output:

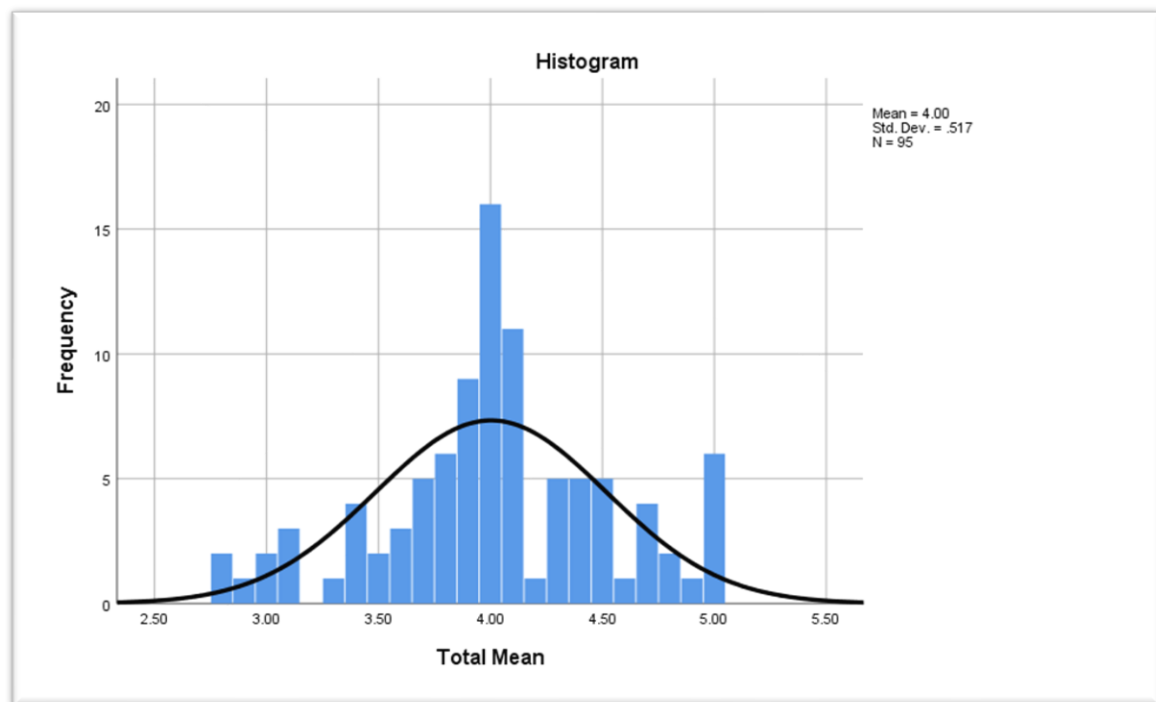
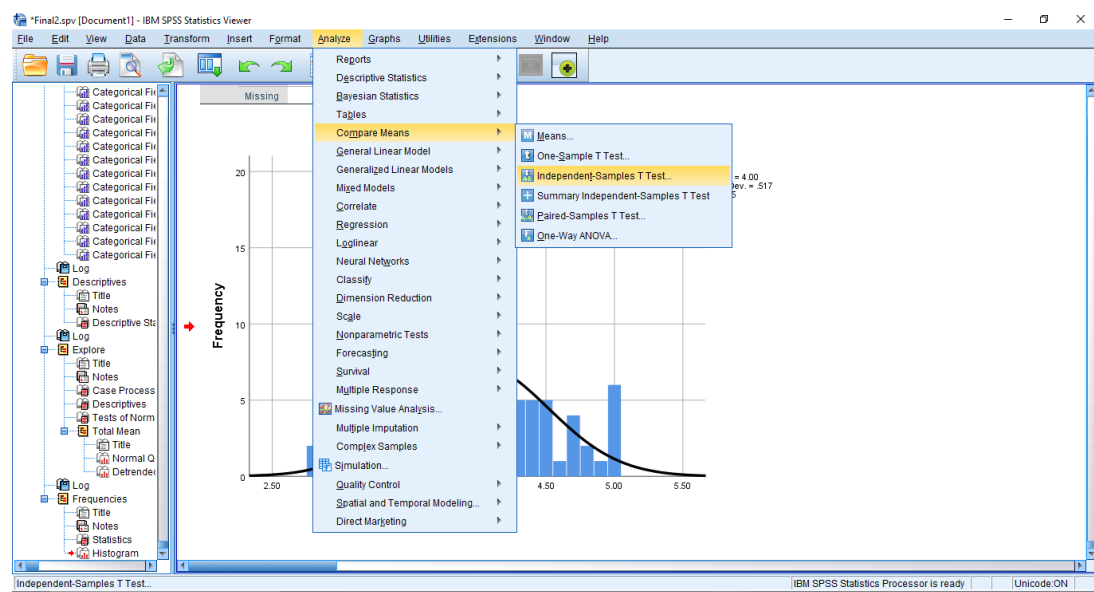


Figure 6: SPSS Frequency represented by Histogram.

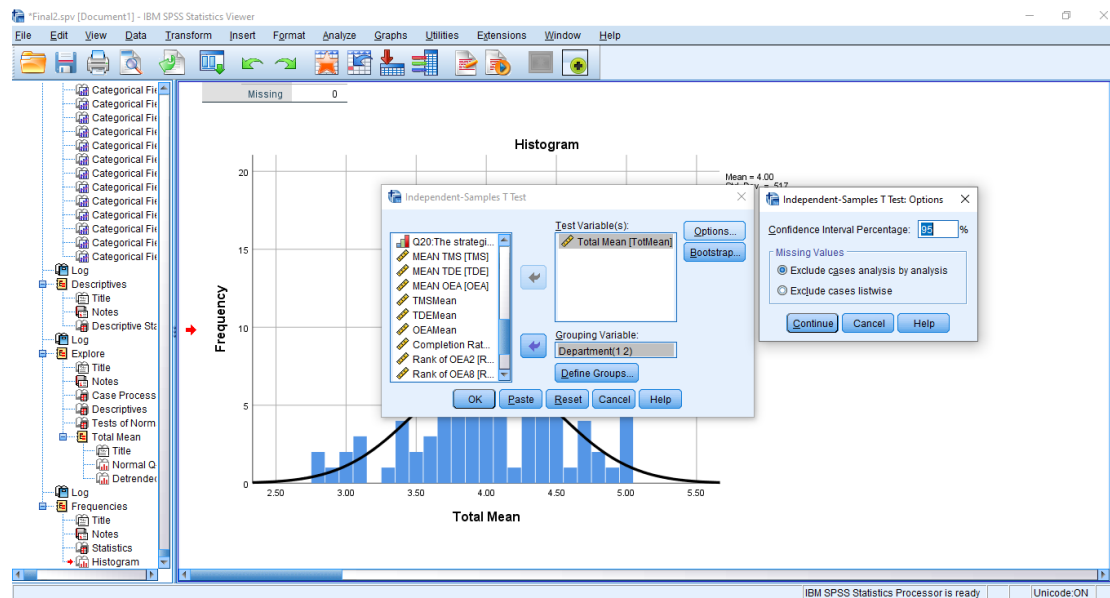
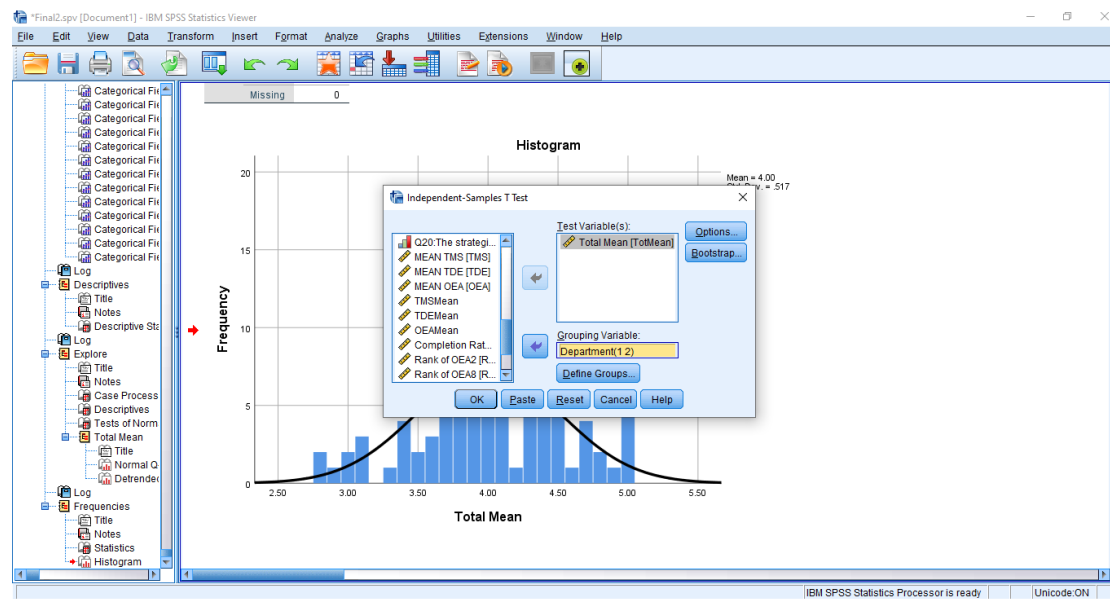
To show the normality test for **TotMean** (Scale Dataset) between two groups in SPSS using Independent Samples T Test.

5. SPSS steps for Independent Sample T Test.

Step1: Analyze > Compare Means > Independent Sample T Test.



Step2: Add TotMean to Test Variable and Nominal Department to Grouping Variables



The output of SPSS for T Test:

T-Test					
Group Statistics					
	Department	N	Mean	Std. Deviation	Std. Error Mean
Total Mean	Engineering	76	4.0092	.52926	.06071
	Non-Engineering	19	3.9763	.47533	.10905

Independent Samples Test									
Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Total Mean	Equal variances assumed	.929	.338	.247	93	.805	.03289	.13319	-.23159 .29738
	Equal variances not assumed			.264	30.191	.794	.03289	.12481	-.22193 .28772

The Mean is the most important value here. Both Engineering and non-engineering participants relatively the same. There is no significant difference between both in Mean.

In the context of the independent samples t-test:

- **Levene's Test for Equality of Variances:**
 - ✓ The Levene's test examines whether the variances of the two groups (Engineering and Non-Engineering departments) are equal.
 - ✓ The obtained F value is 0.929, with a corresponding p-value of 0.338, indicating that there's no significant difference in variances between the two groups ($p > 0.05$). Hence, the assumption of equal variances is met.
- **T-test for Equality of Means:**
 - ✓ The t-test compares the means between the Engineering and Non-Engineering departments.
 - ✓ Assuming equal variances, the t-value is 0.247 with 93 degrees of freedom. The associated two-tailed p-value is 0.805, which is higher than the significance level of 0.05.
 - ✓ When variances are not assumed to be equal, the t-value becomes 0.264 with 30.191 degrees of freedom. The p-value is 0.794, still above 0.05.
 - ✓ Both cases demonstrate that there is no statistically significant difference between the mean scores of the Engineering and Non-Engineering departments.

3. Rank Correlation:

Rank correlation is used to assess the relationship or association between variables when the data is in the form of ranks or ordinal categories rather than continuous numerical values.

Spearman's Rank Correlation: Assess relationships between ranked variables.

Correlations					
			MEAN OEA	MEAN TDE	MEAN TMS
Spearman's rho	MEAN OEA	Correlation Coefficient	1.000	.728**	.790**
		Sig. (2-tailed)	.	.000	.000
		N	95	95	95
	MEAN TDE	Correlation Coefficient	.728**	1.000	.723**
		Sig. (2-tailed)	.000	.	.000
		N	95	95	95
	MEAN TMS	Correlation Coefficient	.790**	.723**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	95	95	95
**. Correlation is significant at the 0.01 level (2-tailed).					

- The table illustrates the Spearman's rank correlation coefficients between three variables: MEAN OEA (Operational Efficiency and Adaptability), MEAN TDE (Virtual Team Dynamics and Environment), and MEAN TMS (Virtual Team Management Strategies).
- The correlation between MEAN OEA and MEAN TDE is strong and positive ($\rho = 0.728$, $p < 0.01$). This indicates a significant positive relationship between Operational Efficiency and Adaptability and the Dynamics and Environment of the virtual team.
- Similarly, there's a strong and positive correlation between MEAN OEA and MEAN TMS ($\rho = 0.790$, $p < 0.01$), signifying a significant positive relationship between Operational Efficiency and Adaptability and the Management Strategies employed in virtual teams.
- Additionally, a strong correlation exists between MEAN TDE and MEAN TMS ($\rho = 0.723$, $p < 0.01$), indicating a significant positive relationship between Virtual Team Dynamics/Environment and Virtual Team Management Strategies.

Overall, these strong positive correlations suggest that as one variable increases, the others tend to increase as well, showing a coherent relationship between Operational Efficiency and Adaptability, Virtual Team Dynamics/Environment, and Virtual Team Management Strategies within the studied context.

4. Visualization:

Use visual aids like box plots, bar charts, or histograms to represent Likert scale data distributions and differences between groups or strategies.

Calculate Mean:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Descriptives."
- ✓ Select the variable representing "Team Management Strategies (TMS)" and move it to the "Variables" box.

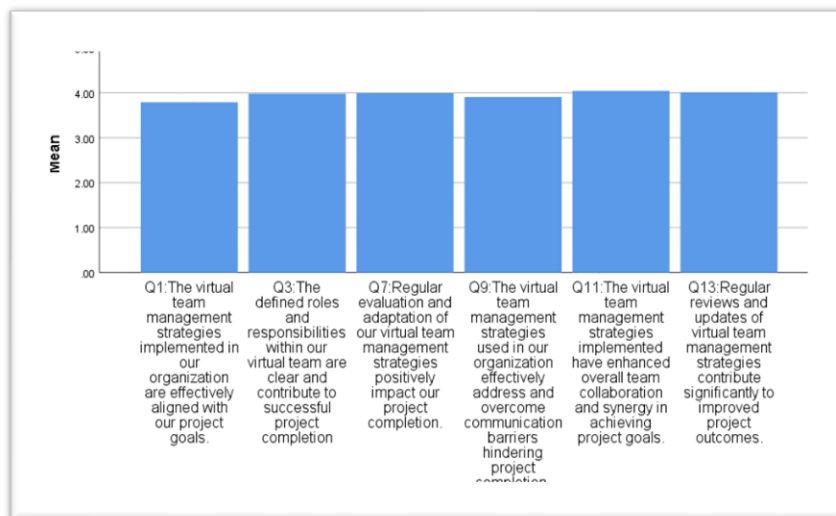


Figure 7: SPSS Mean Representation for Team Management Strategies Questionnaire Group

Generate Frequencies:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Frequencies."
- ✓ Select the variable representing "Team Management Strategies (TMS)."

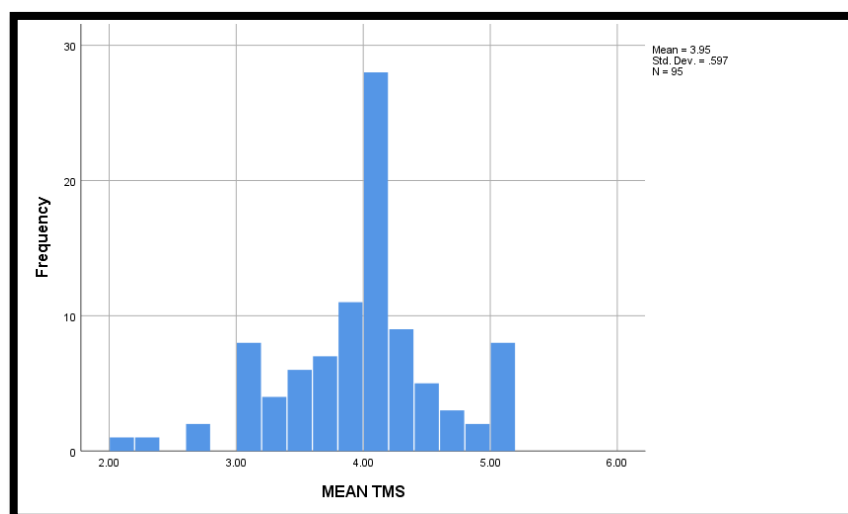


Figure 8: SPSS Frequency Representation for Team Management Strategies Questionnaire Group

Calculate Mean:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Descriptives."
- ✓ Select the variable representing " Team Dynamics and Environment (TDE) " and move it to the "Variables" box.

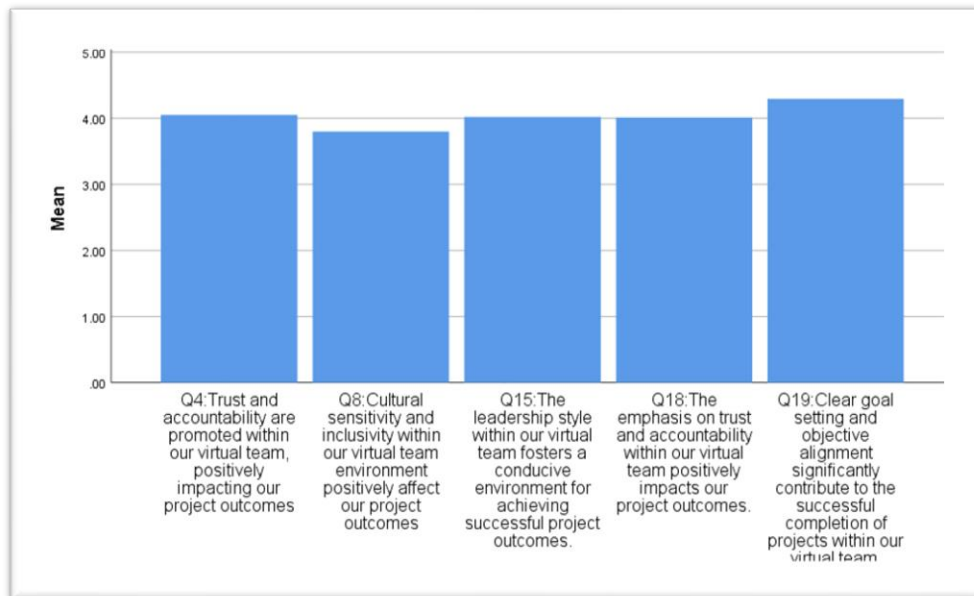


Figure 9: SPSS Mean Representation for Team Dynamics and Environment Questionnaire Group

Generate Frequencies:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Frequencies."
- ✓ Select the variable representing " Team Dynamics and Environment (TDE) "

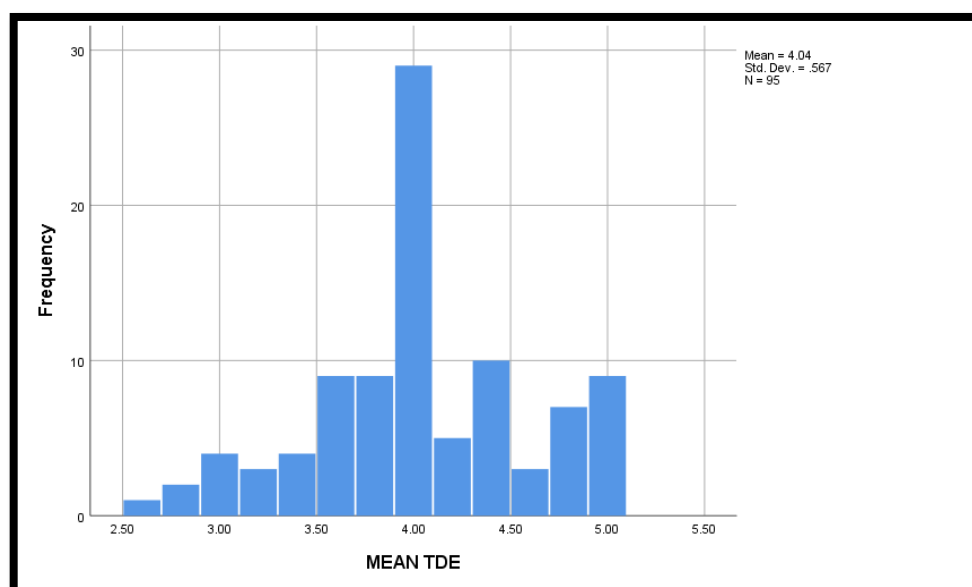


Figure 10: SPSS Frequency Representation for Team Dynamics and Environment Questionnaire Group

Calculate Mean:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Descriptives."
- ✓ Select the variable representing " Operational Efficiency and Adaptability (OEA) " and move it to the "Variables" box.

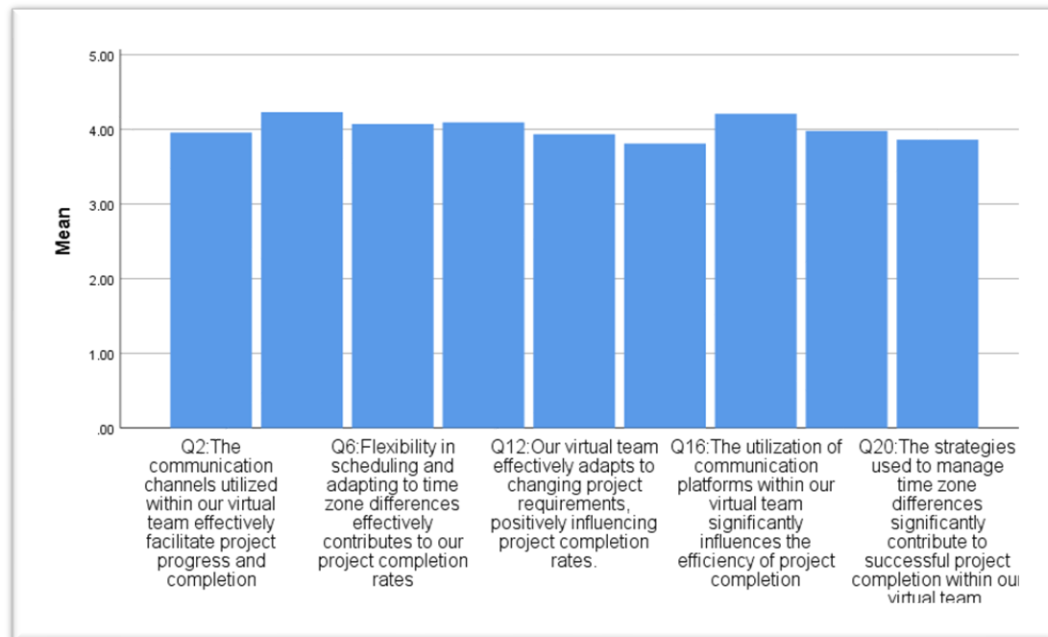


Figure 11: SPSS Mean Representation for Operational Efficiency and Adaptability Questionnaire Group

Generate Frequencies:

- ✓ Go to the menu bar, click on "Analyze," then select "Descriptive Statistics," and choose "Frequencies."
- ✓ Select the variable representing " Operational Efficiency and Adaptability (OEA) "

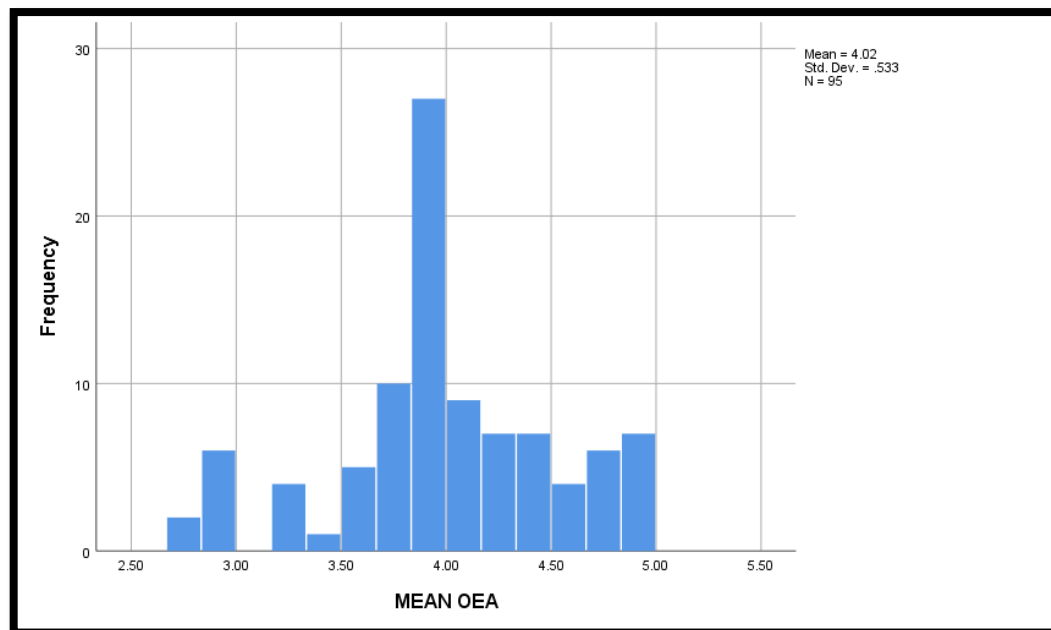


Figure 12: SPSS Frequency Representation for Operational Efficiency and Adaptability Questionnaire Group

5. Interpretation:

Interpret the non-parametric test results. Determine if there are significant differences or relationships between the use of different virtual team strategies (rated on the Likert scale) and perceptions related to project completion.

❖ Compare Q1 & Q2: using **One-Sample Chi-Square Test**

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The categories of Q1: The virtual team management strategies implemented in our organization are effectively aligned with our project goals. occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
2	The categories of Q2: The communication channels utilized within our virtual team effectively facilitate project progress and completion occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .050.				

- It suggests that there is a statistically significant effect, relationship, or difference in the data that goes against the assumption specified by the null hypothesis.
- By rejecting the null hypothesis, the data supports the alternative hypothesis, which typically proposes that there is a relationship, difference, or effect present in the population.
- The rejection of the null hypothesis leads to the conclusion that there is likely a real effect or relationship in the population, rather than the observed results being due to random chance or sampling variability.

❖ Compare Q1 & Q2: using **Spearman's Rank Correlation**

Correlations				
			Q1:The virtual team management strategies implemented in our organization are effectively aligned with our project goals.	Q2:The communication channels utilized within our virtual team effectively facilitate project progress and completion
Spearman's rho	Q1:The virtual team management strategies implemented in our organization are effectively aligned with our project goals.	Correlation Coefficient	1.000	.583**
		Sig. (2-tailed)	.	.000
		N	95	95
	Q2:The communication channels utilized within our virtual team effectively facilitate project progress and completion	Correlation Coefficient	.583**	1.000
		Sig. (2-tailed)	.000	.
		N	95	95

** . Correlation is significant at the 0.01 level (2-tailed).

- If the **correlation coefficient** is close to +1 or -1, it indicates a **strong relationship**.
- A **positive correlation** suggests that as one variable increases, the other tends to increase as well.
- A **negative correlation** indicates that as one variable increases, the other tends to decrease.
- Assess the **p-value** associated with the correlation coefficient; a low p-value (**<0.05**) indicates a **significant relationship**.

- The value of 0.583 suggests a moderate degree of association between the variables. In Spearman's correlation, the values range from -1 to +1.
- The positive coefficient (+0.583) indicates that as one variable increases in rank (or value), the other tends to increase as well. However, this does not imply a cause-and-effect relationship; it only shows the tendency for both variables to move together in a similar direction.
- Spearman's correlation measures the strength and direction of monotonic relationships. A monotonic relationship means that as the rank (or value) of one variable increases, the rank (or value) of the other variable tends to consistently increase or decrease. It doesn't necessarily imply a linear relationship.

- A correlation coefficient of 0.583 suggests a moderately strong association. It's not perfect but still substantial enough to indicate a discernible relationship between the variables.
- Additionally, consider the associated p-value. If it is less than your chosen significance level (e.g., 0.05), it indicates that the observed correlation is statistically significant.

6. Discussion:

The analysis focuses on findings derived from Likert scale examination, specifically emphasizing non-parametric relationships. It underscores strategies or perceptions pivotal in driving project completion within the private engineering sector.

Various analyses have been performed to investigate how virtual team management strategies influence project completion within the private sector.

- **Descriptive Statistics:** These summaries offer insights into the central tendencies (mean, median, mode), variability (standard deviation, range), and distribution of Likert scale dataset.

If the median and mode for each Likert item are consistently showing a value of 4, indicating agreement, it suggests a tendency towards a particular response in the dataset. In research case, a median and mode of 4 across Likert items implies that a significant proportion of participants agreed that virtual team strategies have a positive impact on project completion.

Interpretation:

- ✓ **Consistent Response:** The consistency across Likert items with a median and mode of 4 signifies a strong trend in responses. It suggests that the majority of participants share a positive view regarding the impact of virtual team strategies on project completion.
- ✓ **Directional Consensus:** A median and mode of 4 specifically indicate agreement in Likert scale interpretation (e.g., "Agree" in a 5-point Likert scale). This suggests a cohesive opinion among participants that these strategies are beneficial for project completion.
- ✓ **Limited Variability:** The absence of variation or spread in responses (as indicated by the consistent median and mode) could imply a homogenous perspective among respondents regarding the positive impact of virtual team strategies.

Considerations:

- ✓ **Contextual Understanding:** While the data indicates agreement, consider the context of the survey questions and the potential biases in responses. Sometimes, respondents might tend to give favorable responses without reflecting their true opinions.
- ✓ **Interpretation Caution:** Even with a strong consensus in the dataset, interpretations should be cautious. It's essential to consider the nature of Likert scales (ordinal in nature) and avoid assuming interval-level properties or making strong causal claims solely based on the statistical measures.
- ✓ **Further Analysis:** Although the data shows a consistent trend, consider additional analyses or qualitative methods to delve deeper into understanding why participants agree or how these strategies specifically impact project completion.

In summary, the consistent median and mode of 4 across Likert items strongly suggest a prevailing agreement among respondents regarding the positive impact of virtual team strategies on project completion. However, interpreting these findings should involve a nuanced understanding of the context, potential biases, and the limitations of Likert scale analysis.

- **Frequency Distribution:** This assists in grasping the spread of responses across diverse categories within the Likert scale, offering insights into participants' perceptions or ratings of different elements.

Example on Q3: *The defined roles and responsibilities within our virtual team are clear and contribute to successful project completion.*

The percent frequency distribution provides a detailed breakdown of responses regarding the clarity of roles and responsibilities within the virtual team in relation to successful project completion. It gives a clear picture of the participants' perspectives on this particular aspect. Below is an analysis and explanation of the percentages:

Breakdown of Responses:

- ✓ **Strongly Disagree (1.1%):** A very small fraction of respondents strongly disagree that clarity in roles contributes to project success. This minority opinion indicates a limited number of individuals who hold a strong opposing view.
- ✓ **Disagree (4.2%):** A slightly higher percentage disagrees with the statement, but it's still relatively low. This indicates a slightly larger but still minority segment of respondents who do not see clarity in roles as contributing significantly to project success.
- ✓ **Neutral (13.7%):** A substantial portion of respondents express neutrality or indecision regarding the clarity of roles and their impact on project success. This suggests a significant number of participants who might not firmly agree or disagree with the statement.
- ✓ **Agree (57.9%):** The majority of respondents agree that clear roles contribute positively to project completion. This represents a significant consensus among participants supporting the idea that well-defined roles are beneficial.
- ✓ **Strongly Agree (23.2%):** A sizable proportion of respondents strongly endorse the idea that well-defined roles and responsibilities are crucial for successful project completion. This indicates a substantial agreement among participants regarding the importance of role clarity.

Overall Interpretation:

The combined percentage of Agree and Strongly Agree responses (81.1%) highlights a predominant belief among participants that clarity in roles and responsibilities significantly contributes to successful project completion within the virtual team environment.

Implications:

- ✓ **Strong Consensus:** The substantial agreement among participants (81.1%) reinforces the importance placed on role clarity within the virtual team for successful project outcomes.
- ✓ **Minor Dissent:** While a minority expresses disagreement or neutrality, their percentages are comparatively low, suggesting that the overwhelming majority leans towards valuing role clarity.
- ✓ **Consideration:** The percentage of neutral responses (13.7%) signifies a portion of participants who might require further clarification or exhibit uncertainty regarding this aspect.

This breakdown of percentages provides valuable insights into participant perspectives, emphasizing the widespread agreement on the importance of clear roles and responsibilities in achieving successful project completion within virtual team settings.

Example Q15: *The leadership style within our virtual team fosters a conducive environment for achieving successful project outcomes.*

The percent frequency distribution provides a comprehensive breakdown of participant responses concerning the impact of leadership style within virtual teams on achieving successful project outcomes. Let's break down and interpret the percentages:

Breakdown of Responses:

- ✓ **Strongly Disagree (1.1%):** A very small fraction of respondents strongly disagree that leadership style contributes to successful project outcomes. This minority opinion indicates a limited number of individuals who strongly oppose this idea.
- ✓ **Disagree (5.3%):** A slightly higher percentage disagrees with the notion, but it still remains relatively low. This suggests a small but increased fraction of respondents who do not believe in the significant impact of leadership style on project success.
- ✓ **Neutral (10.5%):** A notable portion expresses neutrality or uncertainty regarding the influence of leadership style on project outcomes. This indicates a significant number of participants who might not firmly agree or disagree with the statement.
- ✓ **Agree (56.8%):** A significant majority agrees that leadership style fosters a conducive environment for achieving successful project outcomes. This represents a substantial consensus among participants supporting the idea that leadership style matters.
- ✓ **Strongly Agree (26.3%):** A considerable proportion of respondents strongly endorse the idea that leadership style significantly contributes to successful project outcomes. This indicates a substantial agreement among participants regarding the importance of leadership style.

Overall Interpretation:

The combined percentage of Agree and Strongly Agree responses (83.1%) highlights a predominant belief among participants that leadership style within virtual teams significantly influences successful project outcomes.

Implications:

- ✓ **Strong Consensus:** The overwhelming majority (83.1%) acknowledging the positive influence of leadership style suggests a shared belief among participants regarding its significance in achieving successful project outcomes.
- ✓ **Minor Dissent:** While a minority expresses disagreement or neutrality, their percentages are relatively low, indicating a general inclination towards valuing the impact of leadership style.
- ✓ **Consideration:** The percentage of neutral responses (10.5%) suggests a portion of participants who might require further clarification or exhibit uncertainty regarding the impact of leadership style.

This breakdown emphasizes the widespread agreement among participants on the importance of leadership style within virtual teams for achieving successful project outcomes, suggesting that it's a significant factor contributing to success.

Example Q17: *The strategies implemented effectively address and mitigate technology-related challenges, positively influencing project completion rates.*

The percent frequency distribution offers a detailed breakdown of participant responses regarding the effectiveness of strategies in addressing technology-related challenges and their impact on project completion rates within virtual teams. Based on the percentages provided, here is an analysis:

Breakdown of Responses:

- ✓ **Strongly Disagree (1.1%):** A minimal fraction of respondents strongly disagree that the strategies effectively address technology-related challenges and positively influence project completion rates. This indicates a very small number of participants holding a strong opposing view.
- ✓ **Disagree (4.2%):** A small percentage disagrees with the effectiveness of the strategies in mitigating technology-related challenges and their impact on project completion rates. This suggests a slight disagreement among some participants.
- ✓ **Neutral (11.6%):** A modest portion expresses neutrality or indecision regarding the effectiveness of the strategies in addressing technology-related challenges and their impact on project completion rates. This indicates a significant number of participants who are uncertain or do not firmly take a stance.
- ✓ **Agree (62.1%):** A substantial majority agrees that the strategies effectively address technology-related challenges and positively impact project completion rates. This represents a significant consensus among participants supporting the effectiveness of these strategies.
- ✓ **Strongly Agree (21.1%):** A significant portion of respondents strongly believe that strategies effectively mitigate technology-related challenges, positively influencing project completion rates. This indicates a strong endorsement of the effectiveness of the strategies.

Overall Interpretation:

The combined percentage of Agree and Strongly Agree responses (83.2%) highlights a predominant belief among participants that the implemented strategies effectively address technology-related challenges, positively impacting project completion rates within virtual teams.

Implications:

- ✓ **Strong Consensus:** The overwhelming majority (83.2%) endorsing the effectiveness of strategies suggests a shared belief among participants regarding their positive impact on project completion rates.
- ✓ **Minor Dissent and Neutrality:** While a small proportion expresses disagreement or neutrality, their percentages are relatively low compared to the majority, indicating a general inclination towards the effectiveness of the strategies.

- ✓ **Consideration:** The percentage of neutral responses (11.6%) suggests a portion of participants who might require further clarification or exhibit uncertainty regarding the effectiveness of these strategies.

This breakdown underscores the widespread agreement among participants regarding the efficacy of strategies in addressing technology-related challenges and their positive impact on project completion rates within virtual teams.

- **Non-parametric Analysis:** This method is valuable for examining ordinal data (such as Likert scales) when the conditions for parametric tests aren't fulfilled. Tests like the Mann-Whitney U test, a non-parametric test, belong to this category and compare medians among separate groups.

When utilizing Likert scales, non-parametric tests like the Mann-Whitney U test could be more suitable as they do not depend on normality assumptions and are better suited for analyzing ordinal data.

The summary of the Mann-Whitney U test conducted on the statement about the significance of clear goal setting and objective alignment in successful project completion between Engineering and non-Engineering departments reveals an interesting outcome.

Interpretation:

- ✓ **Null Hypothesis and Significance Level:** The null hypothesis assumes no significant difference between the perceptions of Engineering and non-Engineering departments regarding the importance of clear goal setting for project completion. The significance level chosen here is 0.05.
- ✓ **Test Results:** The Mann-Whitney U test yielded a p-value of 0.010 for the statement under consideration.
- ✓ **Decision:** With a p-value of 0.010 being less than the chosen significance level of 0.05, the null hypothesis is rejected. This indicates a statistically significant difference in the perceptions or responses between Engineering and non-Engineering departments regarding the importance of clear goal setting and objective alignment for successful project completion within virtual teams.

Implications:

- ✓ **Statistical Significance:** The p-value of 0.010 suggests a strong level of statistical significance, indicating that the observed differences in opinions or agreement on this specific statement ("Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team") are unlikely due to random chance.
- ✓ **Divergence in Perceptions:** The rejection of the null hypothesis implies a notable divergence in opinions between the Engineering and non-Engineering departments regarding the significance of clear goal setting and alignment for project completion. This could potentially indicate varying priorities or approaches to project management between these departments.

Considerations:

- ✓ **Contextual Analysis:** While the statistical test indicates a significant difference, further qualitative or contextual analysis might provide deeper insights into why this difference in perceptions exists between the departments.
- ✓ **Actionable Insights:** Understanding these divergent perceptions could help tailor strategies or interventions specific to each department to enhance goal setting practices and improve project outcomes within the virtual team setting.

This significant result suggests that there's a substantial difference in how Engineering and non-Engineering departments perceive the role of clear goal setting and alignment in project completion within virtual teams.

- **Normally Distributed Tests:** These assessments, such as the Shapiro-Wilk test, determine if the data adheres to a normal distribution. However, due to the ordinal nature of Likert scale data, the assumptions of normality might not be applicable.

The provided normality tests, Kolmogorov-Smirnov and Shapiro-Wilk, aim to assess whether a variable (Total Mean in this case) follows a normal distribution. Here's an interpretation based on the results:

Kolmogorov-Smirnov Test:

- ✓ **Statistic:** 0.109
- ✓ **Degrees of Freedom:** 95
- ✓ **Significance (p-value):** 0.007

Shapiro-Wilk Test:

- ✓ **Statistic:** 0.971
- ✓ **Degrees of Freedom:** 95
- ✓ **Significance (p-value with Lilliefors correction):** 0.034

Interpretation:

- 1. Kolmogorov-Smirnov Test Result (p-value = 0.007):**
 - ✓ The Kolmogorov-Smirnov test assesses normality based on the discrepancy between the empirical distribution function and the expected normal distribution.
 - ✓ A small p-value (less than 0.05) suggests that the data significantly deviates from a normal distribution.
 - ✓ In this case, the p-value of 0.007 indicates a significant departure from normality for the Total Mean variable.
- 2. Shapiro-Wilk Test Result (p-value = 0.034 with Lilliefors correction):**
 - ✓ The Shapiro-Wilk test is suitable for smaller sample sizes (like the one here, with 95 observations) and is known for its accuracy in detecting departures from normality.
 - ✓ Similar to the Kolmogorov-Smirnov test, a p-value less than 0.05 would suggest non-normality.
 - ✓ The p-value of 0.034 (corrected using Lilliefors method) further supports the indication of non-normality in the Total Mean variable.

Conclusion:

Both tests, Kolmogorov-Smirnov and Shapiro-Wilk, exhibit significant p-values (0.007 and 0.034, respectively). This suggests that the assumption of normality is not met for the Total Mean variable.

Considerations:

- ✓ **Non-Normality Impact:** The non-normality of data might affect the appropriateness of certain statistical tests or models that assume normal distribution.
- ✓ **Transformations or Alternative Tests:** Depending on the analysis, transformation of data or using non-parametric tests might be more suitable for non-normally distributed data.

In summary, based on these test results, it's reasonable to conclude that the Total Mean variable does not follow a normal distribution, which should be taken into consideration when planning analyses or drawing conclusions reliant on normality assumptions.

- **Independent Sample t-test:** This particular test is commonly employed for continuous data, presuming normality and even variance distribution. However, applying it to Likert scale data demands caution as these data may not precisely conform to these assumptions.

The independent samples t-test compares the means between two groups (Engineering and Non-Engineering departments) to assess if there's a significant difference between their means. Here is an analysis derived from the test results:

Levene's Test for Equality of Variances:

- ✓ **F value:** 0.929
- ✓ **p-value:** 0.338

Interpretation:

- ✓ The Levene's test checks if the variances of the two groups are equal.
- ✓ A non-significant p-value (greater than 0.05) indicates that there's no significant difference in variances between the Engineering and Non-Engineering departments. Thus, the assumption of equal variances is met.

T-test for Equality of Means (Assuming Equal Variances):

- ✓ **t-value:** 0.247
- ✓ **Degrees of Freedom:** 93
- ✓ **p-value:** 0.805 (two-tailed)

Interpretation:

- ✓ With equal variances assumed, the t-value is 0.247 with a p-value of 0.805.
- ✓ A p-value higher than 0.05 indicates no statistical significance.
- ✓ This implies that there's no significant difference between the mean scores of the Engineering and Non-Engineering departments when assuming equal variances.

T-test for Equality of Means (Without Assuming Equal Variances):

- ✓ **t-value:** 0.264
- ✓ **Degrees of Freedom:** 30.191
- ✓ **p-value:** 0.794 (two-tailed)

Interpretation:

- ✓ When variances are not assumed to be equal, the t-value changes slightly to 0.264 with a p-value of 0.794.
- ✓ Even without assuming equal variances, the p-value remains higher than 0.05.
- ✓ Both cases (with and without assuming equal variances) demonstrate that there's no statistically significant difference between the mean scores of the Engineering and Non-Engineering departments.

Conclusion:

The test results consistently show that the mean scores between the Engineering and Non-Engineering departments are not significantly different. Regardless of whether equal variances are assumed or not, the p-values are higher than 0.05, indicating no statistical significance. Therefore, based on this analysis, there's no significant disparity in mean scores between the two departments.

7. Recommendations:

Based on the analysis, offer recommendations for the adoption or emphasis of specific virtual team management strategies that seem to positively influence project completion in private engineering sectors.

Given the analysis indicating no significant difference in perceived virtual team management strategies between Engineering and Non-Engineering departments, it's essential to focus on strategies that align with positive project outcomes. Here are industry-specific recommendations designed for private engineering sectors:

1. Enhanced Communication Platforms:

Place a strong emphasis on effective communication tools that allow engineering teams to work together and share information easily. Take into account systems that combine communication channels and project management tools for effective workflows.

2. Goal Alignment and Clarity:

Enhance strategies to ensure clarity in project goals and align teams accordingly. Well-defined objectives improve focus, minimize miscommunications, and ultimately lead to more successful project outcomes.

3. Agile Methodologies and Adaptability:

Encourage the adoption of agile methodologies suited for engineering projects. Foster an environment that values adaptability, iterative development, and quick response to changes, allowing teams to address evolving project requirements effectively.

4. Cross-Functional Collaboration:

Encourage teamwork that spans across and within engineering teams. Emphasize sharing knowledge, fostering interdisciplinary collaboration, and harnessing diverse skill sets to efficiently tackle complex engineering challenges.

5. Leadership and Supportive Management:

Emphasize the role of supportive leadership within engineering teams. Foster a culture that values mentorship, provides support for skill development, and empowers team members to make decisions aligned with project goals.

6. Continuous Improvement and Feedback:

Create avenues for ongoing enhancement by promoting regular feedback cycles. Introduce frameworks to gather, assess, and act on feedback provided by team members, refining processes and effectively addressing challenges.

7. Technology Adoption and Innovation:

Encourage the adoption of cutting-edge technologies and tools relevant to engineering domains. Foster an innovative culture that promotes experimentation and the exploration of new solutions to elevate project efficiency.

8. Training and Development Initiatives:

Invest in ongoing training programs tailored to the specific needs of engineering teams. Provide team members with the latest skills, tools, and methodologies required to excel in their roles within virtual team settings.

9. Project Evaluation and Reflection:

Incorporate Key Performance Indicators (KPIs) into regular project evaluations to measure the effectiveness of adopted strategies. Encourage post-project reflection sessions to identify successes, challenges, areas for improvement, and align them with the established KPIs.

10. Tailored Strategy Implementation:

Develop specific, customized strategies for each project, detailing objectives, timelines, resources, risk assessments, and adaptable plans to ensure successful outcomes. Regularly review and adjust these strategies as needed to stay aligned with project progress and changes.

These recommendations aim to enhance project completion within private engineering sectors by emphasizing strategies that foster collaboration, clarity, adaptability, innovation, and continuous improvement within virtual team environments. Tailoring these strategies to suit the engineering domain's intricacies will likely yield more effective outcomes.

8. Conclusion:

The analysis of Likert scale data using non-parametric methods has yielded valuable insights into virtual team management strategies and their impact on project completion within the private engineering sector. This approach, free from distribution assumptions, allowed for a robust statistical examination of participants' responses, leading to several key findings:

a) Perception Alignment:

The data revealed a consistent trend in participant responses across various Likert items, indicating a substantial consensus regarding certain aspects of virtual team strategies. This alignment in perceptions highlights shared beliefs within the private engineering sector regarding specific management strategies.

b) Strategic Focus Areas:

Certain areas, such as clear goal setting, role clarity, and effective communication, emerged as crucial factors influencing successful project completion within virtual teams. The data underscores the importance of these strategies in fostering positive project outcomes.

c) Minimal Interdepartmental Variance:

The analysis revealed no significant variance between Engineering and Non-Engineering departments concerning the perceived effectiveness of virtual team management strategies. This suggests a uniformity in strategic perceptions across diverse departments within the private engineering sector.

d) Implications for Strategy Emphasis:

The findings emphasize the need for targeted emphasis on key virtual team management strategies, such as goal alignment, role clarity, and communication enhancement. Focusing efforts on these areas could potentially yield substantial improvements in project completion rates.

e) Continuous Improvement:

The study highlights the importance of a culture of continuous improvement within virtual teams. Regular evaluation, feedback integration, and adaptability to changing project dynamics emerged as critical components for sustained success.

Implications for Practice:

For private engineering sectors aiming to optimize project completion within virtual team environments, leveraging these findings suggests a need to:

- ✓ Prioritize strategies emphasizing clear goal setting, role clarity, and effective communication.
- ✓ Foster a culture of continuous improvement, feedback incorporation, and adaptability within virtual teams.
- ✓ Tailor strategic implementations based on these key areas to enhance project outcomes.

9. Limitations & Future Directions

Acknowledging the limitations and suggesting future directions for research is crucial for refining and validating the study's findings.

Limitations:

- **Survey Design Constraints:** Using only survey data might not fully capture all the details or context that affect how people see things. The way the survey was set up or the words used might have influenced how participants answered.
- **Contextual Factors:** External factors like how the organization operates, the nature of projects, or team interactions could have influenced how participants responded, even though these aspects weren't specifically asked about in the survey. These factors might have affected how we interpreted the survey results.
- **Cross-Sectional Nature:** The research might not cover changes over time as it focuses on a single moment. Studying changes over a longer period through longitudinal research could provide a fuller & better understanding of how opinions change.
- **Sample Size and Generalizability:** The study might offer helpful insights for one engineering sector, but the size and range of the group could limit how much these findings apply to other industries or wider contexts.

Future Directions:

- **Qualitative Assessments:** Complement survey data with qualitative methods like interviews or focus groups to delve deeper into the nuances of virtual team dynamics, contextual factors, and perceptions not captured through quantitative measures done by Likert Scale questionnaire.
- **Longitudinal Studies:** Perform extended studies that track how perceptions and strategies evolve over time, observing changes, trends, and the effects of interventions on project results within virtual teams.
- **Contextual Analysis:** Explore the influence of specific contextual factors (organizational culture, project complexity, team structures) on the effectiveness of virtual team management strategies.
- **Comparative Studies:** Conduct comparative analyses across diverse industries or organizational sizes to ascertain the universality of findings and identify industry-specific best practices.
- **Experimental Interventions:** Implement controlled experiments or interventions to test the efficacy of specific management strategies on project outcomes within virtual team settings.

While the Likert scale analysis offered crucial insights into virtual team management strategies, recognizing the study's limitations and proposing future directions ensures a more comprehensive understanding of these strategies' impact. Addressing these limitations and exploring new avenues for research will contribute to refining practices and enriching knowledge in the field of virtual team management within private sector engineering.

Previous Studies

Previous studies on the impact of virtual team management strategies on project completion within the organizational environment of the private sector have laid a foundational understanding of this dynamic field. Researchers have delved into the challenges and benefits associated with virtual teams, often emphasizing the need for effective management strategies to navigate the complexities of remote collaboration. These studies have examined various aspects of virtual teams, including communication structures, leadership styles, and the integration of technology, offering valuable insights into their influence on project outcomes.

One notable focus in prior research has been the examination of communication strategies within virtual teams. According to Wong and Burton (2001), enhancing communication accessibility, implementing coordination facilitators, defining role expectations, and nurturing a shared team culture are suggested to enhance the efficacy of virtual team performance (Schlenkrich, Upfold, 2009). Studies have explored the effectiveness of different communication channels, the impact of cultural diversity on communication, and the role of clear communication in project success. In their review of contemporary empirical studies on virtual team management, Hertel, Geister, and Konradt (2005) highlighted obstacles including communication hurdles, trust deficits, and feelings of social isolation (Axtell, Demaria, & Gurick, 2022). Understanding the nuances of communication in virtual teams is essential, as it directly affects coordination, collaboration, and ultimately, project completion rates in the private sector. In their investigation into global virtual team dynamics and efficacy, Maznevski and Chudoba (2000) concluded that success relied significantly on effective communication, trust-building, and cultural sensitivity (Axtell, Demaria, & Gurick, 2022).

Additionally, previous research has investigated leadership styles in virtual team settings. Scholars have explored how different leadership approaches, such as transformational or participative leadership, influence team motivation, engagement, and project outcomes. As suggested by Bell and Kozlowski (2002), virtual team leaders should establish frameworks supporting information exchange, task organization, feedback mechanisms, information handling, and decision-making processes to enable team members to autonomously manage their tasks (Schlenkrich, Upfold, 2009). Identifying effective leadership strategies in the private sector is crucial for ensuring that virtual teams are led in a way that maximizes their potential and contributes to successful project completions.

Technology integration within virtual teams has also been a focal point of prior studies. Research has examined the role of technology tools, collaboration platforms, and project management software in enhancing or hindering project completion. Understanding the impact of technology on virtual teams is particularly pertinent in the private sector, where efficient and streamlined processes can directly contribute to organizational success.

In conclusion, previous studies on the impact of virtual team management strategies in the private sector have provided valuable insights into the intricacies of remote collaboration. These studies have contributed to a growing body of knowledge, emphasizing the importance of tailored strategies for effective communication, leadership, and technology integration. Building upon this foundation, the present research aims to further refine our understanding and offer specific insights into the optimal virtual team management strategies for successful project completion in the private sectors inside the Kingdom of Saudi Arabia.

Summary:

The research project focused on investigating the influence of virtual team management strategies on project completion within the private sector's organizational landscape. Through a comprehensive analysis of survey data and employing various statistical methods, the study aimed to unravel the nuances of how specific strategies impact project outcomes in virtual team settings.

The primary objective was to assess the relationship between virtual team management strategies and project completion within the private sector, specifically focusing on the effectiveness of these strategies in achieving successful project outcomes.

The research utilized a Likert scale questionnaire to gather responses from participants across Engineering and Non-Engineering departments within private organizations. Robust statistical analyses, including non-parametric tests, t-tests, and normality assessments, were employed to analyze the data collected.

Key Findings:

- Consistent trends in participant responses indicated alignment in perceptions regarding certain virtual team strategies.
- Strategies emphasizing clear goal setting, role clarity, and effective communication emerged as pivotal for project success.
- Minimal variance was observed between Engineering and Non-Engineering departments, suggesting uniformity in strategic perceptions.
- Recommendations highlighted the need for targeted emphasis on key strategies and fostering a culture of continuous improvement within virtual teams.

Implications:

The findings underscored the significance of specific virtual team management strategies, offering actionable insights for private sector organizations:

- Prioritization of strategies focusing on goal alignment, role clarity, and communication enhancement.
- Cultivation of a culture emphasizing continuous improvement, feedback integration, and adaptability within virtual teams.
- Tailoring strategic implementations based on identified key areas to enhance project outcomes.

Conclusion:

The research project illuminated crucial insights into the impact of virtual team management strategies on project completion within the private sector. The study's findings provide a roadmap for organizations aiming to optimize project outcomes in virtual team environments by refining their management strategies and fostering adaptive, collaborative team cultures.

Recommendations

Researching virtual team management strategies in engineering requires a deep grasp of the factors influencing project success. Use existing studies, real cases, and evidence from effective virtual teams in engineering. Explore different areas like project management, engineering, behavior, and technology to enrich the research.

Focus on collecting data systematically, using both surveys and interviews to understand stakeholders' views in virtual teams. Use statistics like regression and non-parametric tests to uncover how strategies affect projects. Long-term studies can reveal how virtual teams change over time, making your findings more thorough and reliable.

Engage with fellow researchers, learn from them, and share ideas. Use technology to access current research, ensuring the work is evidence-based. Keep careful records, follow ethical guidelines, and contribute meaningfully to improving virtual team strategies in engineering.

Part Four

Appendices

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Appendixes (Questionnaire Main Format)

This study explores how virtual team management strategies impact project completion in the private sector, focusing on challenges, best practices, and effectiveness. It gathers data from various roles within virtual teams, examining experiences, hurdles, and the success of strategies used. The goal is to understand how these practices directly affect project completion rates in the private sector.

- Which department do you belong to? (1. Engineering, 2. Non-Engineering)
- Team Management Strategies (TMS)

Likert Scale Questionnaire								
Variables			Items	Agreement Scale				
				SD	D	NU	A	SA
				1	2	3	4	5
Team Management Strategies (TMS) Independent Variables	TMS1	Q1	The virtual team management strategies implemented in our organization are effectively aligned with our project goals.					
	TMS2	Q3	The defined roles and responsibilities within our virtual team are clear and contribute to successful project completion					
	TMS3	Q7	Regular evaluation and adaptation of our virtual team management strategies positively impact our project completion.					
	TMS4	Q9	The virtual team management strategies used in our organization effectively address and overcome communication barriers hindering project completion.					
	TMS5	Q11	The virtual team management strategies implemented have enhanced overall team collaboration and synergy in achieving project goals.					
	TMS6	Q13	Regular reviews and updates of virtual team management strategies contribute significantly to improved project outcomes.					

- Team Dynamics and Environment (TDE)

Likert Scale Questionnaire								
Variables			Items	Agreement Scale				
				SD	D	NU	A	SA
				1	2	3	4	5
Team Dynamics and Environment (TDE) Independent Variables	TDE1	Q4	Trust and accountability are promoted within our virtual team, positively impacting our project outcomes					
	TDE2	Q8	Cultural sensitivity and inclusivity within our virtual team environment positively affect our project outcomes					
	TDE3	Q15	The leadership style within our virtual team fosters a conducive environment for achieving successful project outcomes.					
	TDE4	Q18	The emphasis on trust and accountability within our virtual team positively impacts our project outcomes.					
	TDE5	Q19	Clear goal setting and objective alignment significantly contribute to the successful completion of projects within our virtual team.					

- **Operational Efficiency and Adaptability (OEA)**

Likert Scale Questionnaire								
Variables			Items	Agreement Scale				
				SD	D	NU	A	SA
				1	2	3	4	5
Operational Efficiency and Adaptability (OEA) Dependent Variables	OEA1	Q2	The communication channels utilized within our virtual team effectively facilitate project progress and completion					
	OEA2	Q5	The utilization of technology tools within our virtual team significantly enhances our ability to collaborate and complete projects efficiently					
	OEA3	Q6	Flexibility in scheduling and adapting to time zone differences effectively contributes to our project completion rates					
	OEA4	Q10	The leadership style within our virtual team significantly influences our project completion rates.					
	OEA5	Q12	Our virtual team effectively adapts to changing project requirements, positively influencing project completion rates.					
	OEA6	Q14	The implemented strategies sufficiently address challenges arising from cultural diversity within the virtual team, positively impacting project completion.					
	OEA7	Q16	The utilization of communication platforms within our virtual team significantly influences the efficiency of project completion					
	OEA8	Q17	The strategies implemented effectively address and mitigate technology-related challenges, positively influencing project completion rates.					
	OEA9	Q20	The strategies used to manage time zone differences significantly contribute to successful project completion within our virtual team.					

المستخلص

يتناول هذا البحث تأثير استراتيجيات إدارة الفرق الافتراضية على إنجاز المشاريع داخل القطاع الخاص في المملكة العربية السعودية، مع التركيز على المجال الهندسي. باستخدام تقييمات مقياس ليكرت، والتحليلات غير البارامترية، والتحقيقات التجريبية، تهدف الدراسة إلى كشف تعقيدات ديناميكيات الفريق الافتراضي، واستكشاف التحديات مثل معوقات التواصل، والتنوع الثقافي، والفوارق التكنولوجية التي تعيق التعاون الفعال. يركز البحث على القطاعات الهندسية الخاصة في المملكة العربية السعودية، ويهدف إلى تقديم رؤى قائمة على الأدلة لتحسين ممارسات إدارة الفريق الافتراضي، ومواءمة الأهداف، وتعزيز التواصل الفعال، وبناء الثقة، وأساليب القيادة ومعالجة الفوارق التكنولوجية لتعزيز معدلات إنجاز المشاريع وتحسين النتائج ضمن هذا الإطار التنظيمي المحدد.

Abstract

This research investigates the impact of virtual team management strategies on project completion within the private sector of the Kingdom of Saudi Arabia (KSA), focusing on the engineering domain. Utilizing Likert scale evaluations, non-parametric analyses, and empirical investigations, the study aims to unravel the complexities of virtual team dynamics, exploring challenges such as communication barriers, cultural diversity, and technological disparities that impede efficient collaboration. Focused on the private engineering sectors in KSA, the research aims to offer evidence-based insights into optimizing virtual team management practices, goal alignment, fostering effective communication, building trust, leadership styles and addressing technological disparities to enhance project completion rates and improve outcomes within this specific organizational setting.

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