

THE ROLE OF SOCIAL PRESENCE AND VIRTUAL
LEADERSHIP IN ENHANCING THE VIRTUAL TEAMS
PERFORMANCE AMONG ADMINISTRATORS IN THE
HIGHER EDUCATION SECTOR IN MALAYSIA:
KNOWLEDGE SHARING AS A MEDIATOR AND
MEDIA RICHNESS AS A MODERATOR

BY

SALEH ALKOUD

A dissertation submitted in fulfillment of the requirement for
the degree of Doctor of Philosophy in Business
Administration

Kulliyyah of Economics and Management Sciences
International Islamic University Malaysia

NOVEMBER 2024

ABSTRACT

Virtual teams have been used in workplaces in recent years, replacing traditional teams. Therefore, researchers have been interested in how to improve the performance of virtual teams. The main research problem is to re-evaluate the factors influencing the performance of virtual teams in the Malaysian higher education sector to support the creation of effective virtual teams that contribute to the success and survival of institutions. This study aims to investigate the role of the components of social presence (relationship building, trust, cohesion, and communication) and virtual leadership in enhancing the performance of virtual work teams in the higher education sector in Malaysia. Moreover, the study aims to examine the mediating role of knowledge sharing and the moderating role of media richness in previous relationships. The research employed a quantitative research methodology. A survey was conducted using a questionnaire where data was obtained from 373 administrative employees from the Top-Ten Malaysian Universities according to Quacquarelli Symonds (QS) World University Rankings. Structural Equation Modelling (SEM) was employed to test the hypotheses using (IBM AMOS). Findings show that the components of social presence (relationships building, trust, cohesion, and communication) and virtual leadership have a statistically significant impact on the performance of virtual teams. In addition, it was found that knowledge sharing plays a mediating role in the relationship between social presence and the performance of virtual teams, while it does not play a mediating role in the relationship between virtual leadership and the performance of virtual teams. Moreover, it is concluded that media richness did not play a moderating role in the relationship between social presence, virtual leadership and the performance of virtual teams. Thus, the study contributed an original contribution to the literature review on the performance of virtual teams. In the theoretical context, this study makes a significant contribution by exploring previously inadequately examined relationships, such as the mediating role of knowledge sharing and the moderating role of media richness. Sectorally, it stands out as a recent research conducted in Malaysia to evaluate the performance of virtual teams within the higher education sector from an administrative perspective. Methodologically, the study is noteworthy for its focus on administrative employees in the higher education sector, thereby addressing the performance of virtual teams from an administrative standpoint. This contrasts with prior research, which predominantly concentrated on students and examined virtual team performance from an educational perspective.

ملخص البحث

تزايدت وظائف الفرق الافتراضية في أماكن العمل في السنوات الأخيرة، التي أضحت محل الفرق التقليدية. لذلك، اهتم الباحثون بكيفية تحسين أداء الفرق الافتراضية. تكمن مشكلة البحث الرئيسية في إعادة تقييم العوامل المؤثرة على أداء الفرق الافتراضية في قطاع مؤسسات التعليم العالي في ماليزيا لدعم إنشاء فرق افتراضية فعّالة تساهم في نجاح المؤسسات وبقائها. تهدف الدراسة الحالية إلى اختبار دور مكونات الحضور الاجتماعي (بناء العلاقات، الثقة، التماسك، والتواصل) والقيادة الافتراضية في تعزيز أداء فرق العمل الافتراضية في قطاع التعليم العالي في ماليزيا. هدفت الدراسة إلى اختبار الدور الوسيط لتبادل المعرفة، والدور المعدل للثراء الإعلامي في العلاقات السابقة. اعتمد البحث الحالي على المنهج الكمي، فقد أجري مسح باستخدام الاستبيان، وتم الحصول على بيانات من 373 موظفاً إدارياً من موظفي الجامعات الماليزية العشرة الأعلى تصنيفاً حسب QS. وظفت نموذج المعادلات البنائية لاختبار فرضيات الدراسة باستخدام IBM AMOS. أظهرت نتائج الدراسة أن مكونات الحضور الاجتماعي (بناء العلاقات، الثقة، التماسك، والتواصل) والقيادة الافتراضية لها أثر ذو دلالة إحصائية على أداء الفرق الافتراضية. وقد وجد أيضاً أن مشاركة المعرفة تقوم بدور الوسيط في العلاقة بين الحضور الاجتماعي وأداء الفرق الافتراضية، على عكس العلاقة بين القيادة الافتراضية وأداء الفرق الافتراضية. أظهرت نتائج الدراسة أن ثراء الوسائط لم تقم بدور المعدل في العلاقة بين الحضور الاجتماعي والقيادة الافتراضية وبين أداء الفرق الافتراضية. تعد الدراسة الحالية مساهمة معرفية أصيلة في الأدبيات السابقة التي تناولت أداء الفرق الافتراضية. ففي السياق النظري، إن الدراسة الحالية مساهمة مهمة إذ تم اختبار علاقات جديدة لم تتناولها الدراسات السابقة، مثل الدور الوسيط لتبادل المعرفة، والدور المعدل للثراء الإعلامي. في السياق القطاعي تعد الدراسة الحالية دراسة حديثة في ماليزيا تبحث في أداء الفرق الافتراضية في قطاع التعليم العالي الماليزي من وجهة نظر إدارية. وفي السياق المنهجي، تضيف الدراسة الحالية إضافة مهمة حيث يكون مجتمع الدراسة هم الموظفين الإداريين في قطاع التعليم العالي، لذا فقد تم تناول أداء الفرق الافتراضية من وجهة نظر إدارية، بينما ركزت الدراسات السابقة على مجتمع الدراسة المكون من الطلاب حيث تناولت أداء الفرق الافتراضية من وجهة نظر تربوية.

APPROVAL PAGE

The dissertation of Saleh Alkoud has been approved by the following:

Assist. Prof. Dr. Dolhadi Bin Zainudin
Supervisor



Prof. Dr. Suhaimi Bin Mhd. Sarif
Co-Supervisor

Assoc. Prof. Dr. Nurita Binti Juhdi
Internal Examiner

Prof. Dr. Abdul Kadir Bin Othman
External Examiner

Assoc. Prof. Dr. Muhammad Bin Ibrahim
Chairman

DECLARATION

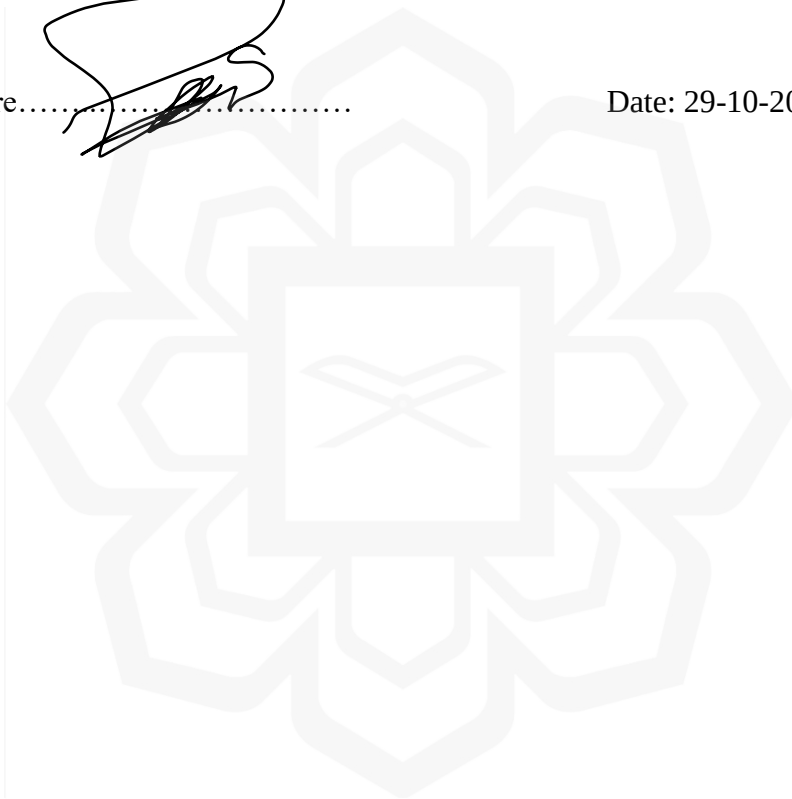
I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Saleh Alkoud

Signature.....



Date: 29-10-2024



COPYRIGHT - Joint

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA DECLARATION OF COPYRIGHT AND AFFIRMATION OF FAIR USE OF UNPUBLISHED RESEARCH

THE ROLE OF SOCIAL PRESENCE AND VIRTUAL LEADERSHIP IN ENHANCING THE VIRTUAL TEAMS PERFORMANCE AMONG ADMINISTRATORS IN THE HIGHER EDUCATION SECTOR IN MALAYSIA: KNOWLEDGE SHARING AS A MEDIATOR AND MEDIA RICHNESS AS A MODERATOR

I declare that the copyright holders of this thesis are jointly owned by the student and IIUM.

Copyright © 2024 Saleh Alkoud and International Islamic University Malaysia. All rights reserved.

No part of this unpublished research may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without prior written permission of the copyright holder except as provided below

1. Any material contained in or derived from this unpublished research may only be used by others in their writing with due acknowledgement.
2. IIUM or its library will have the right to make and transmit copies (print or electronic) for institutional and academic purposes.
3. The IIUM library will have the right to make, store in a retrieval system and supply copies of this unpublished research if requested by other universities and research libraries.

By signing this form, I acknowledged that I have read and understand the IIUM Intellectual Property Right and Commercialization policy.

Affirmed by Saleh Alkoud



.....
Signature

29-10-2024
Date

بسم الله الرحمن الرحيم

With God's help and success, I dedicate this scientific work to my esteemed family, who shared with me the joy of knowledge and illuminated my path with the light of faith and guidance. To my father and mother, a symbol of giving and sacrifice, who taught me that knowledge only comes with effort and determination. And to my brothers and sisters, path partners and loyal friends, who never skimmed on advice and support.

Finally, I dedicate this work to my distinguished teachers who stood by me with all sincerity and support, and to everyone who contributed in any way to the success of this work. You have my sincere thanks and appreciation.

ACKNOWLEDGEMENTS

Alhamdulillah to Allah in the Beginning and the Ending.

First and foremost, I would like to express my gratitude to Asst. Prof. Dr. Dolhadi Bin Zainudin, my supervisor and Prof. Dr. Suhaimi Bin Mhd. Sarif, my co-supervisor. This thesis would never have been completed without their help and committed participation at every stage. For all of your help and patience over the past few years, I sincerely appreciate it.

I would also like to show gratitude to all my lecturers in the Department of Business Administration including Assoc. Prof. Dr. Nurita Binti Juhdi, Prof. Dr. Rafikul Islam, Assist. Prof. Dr. Zabeda Binti Abdul Hamid, Assoc. Prof. Dr. Rodrigue Ancelot Harvey Fontaine, and Assist. Prof. Dr. Amirah Binti Ahmad Suki to mention but few for their teaching style and enthusiasm for different courses and topics made a strong impression on me and I have always carried positive memories of their classes with me.

Most importantly, none of this could have happened without my family. My father, my mother, and my siblings for their constant calls and advices not to give up.

TABLE OF CONTENTS

Abstract	ii
Abstract in Arabic	iii
Approval Page.....	iv
Declaration	v
Copyright Page.....	vi
Dedication	vii
Acknowledgements.....	viii
List of Tables	xv
List of Figures	xix
List of Abbreviations	xxi
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study.....	1
1.2 Overview of the Malaysian Higher Education Industry	8
1.2.1 A Brief Overview of the Higher Education Sector in Malaysia	9
1.2.2 The Challenges of Malaysian Higher Education	12
1.3 Problem Statement	15
1.4 Research Framework.....	20
1.5 Research Questions	21
1.6 Research Objectives	22
1.7 Significance of the Study	23
1.8 Scope of the Study	25
1.9 Definition of Terms.....	26
1.9.1 Definition of Virtual Team.....	26
1.9.2 Definition of Virtual Team Performance	26
1.9.3 Definition of Social Presence	26
1.9.4 Definition of Relationship Building.....	26
1.9.5 Definition of Cohesion	26
1.9.6 Definition of Trust.....	27
1.9.7 Definition of Communication	27
1.9.8 Definition of Virtual Leadership	27
1.9.9 Definition of Knowledge Sharing	27
1.9.10 Definition of Media Richness.....	28
1.10 Chapter Summary.....	28
CHAPTER TWO: LITERATURE REVIEW.....	29
2.1 Introduction.....	29
2.2 Virtual Human Resource Development	29
2.3 Virtual Team	32
2.3.1 Background of Virtual Team.....	32
2.3.2 Concept of Virtual Team.....	35
2.3.3 Types of Virtual Team	37
2.3.3.1 Types of Virtual Teams according to Geographical Distribution.....	37
2.3.3.2 Types of Virtual Teams according to Communication	40

2.3.3.3	Type of Virtual Teams Adopts in the Current Study	40
2.3.4	Benefits of Virtual Team	41
2.3.4.1	Cost Reduction	42
2.3.4.2	Increased Productivity	42
2.3.4.3	Global Market Expansion.....	43
2.3.5	Challenges of Virtual Team.....	43
2.3.5.1	Social Challenges.....	44
2.3.5.2	Technical Challenges	45
2.3.5.3	Diversity Challenges	46
2.4	Virtual Team Performance	46
2.4.1	Concept of Virtual Team Performance	47
2.4.2	Virtual Team Performance Measures	49
2.4.3	Factors Effecting Virtual Team Performance	51
2.4.3.1	Review Researches.....	51
2.4.3.2	Empirical Researches	52
2.5	Social Presence.....	59
2.5.1	Relationship Building.....	61
2.5.2	Cohesion	62
2.5.3	Trust.....	63
2.5.4	Communication	65
2.6	Virtual Leadership.....	66
2.7	Knowledge Sharing.....	69
2.8	Media Rchness	71
2.9	Underlying Theories.....	72
2.9.1	Social Presence Theory	73
2.9.2	Situational Leadership Theory	75
2.9.3	Social Exchange Theory.....	79
2.9.4	Media Richness Theory	81
2.10	Prior Empirical Studies.....	83
2.10.1	Empirical Studies of SP Practices and K.Sh	84
2.10.2	Empirical Studies of VL and KSh.....	87
2.10.3	Empirical Studies of K Sh and VTP	88
2.10.4	Empirical Studies of SP Practices and VTP.....	90
2.10.5	Empirical Studies of VL and VTP	94
2.10.6	Empirical Studies of SP Practices, K.Sh and VTP	95
2.10.7	Empirical Studies of VL, KSh and VTP	96
2.10.8	Empirical Studies of SP Practices, MR, and VTP	97
2.10.9	Empirical Studies of VL, MR and VTP	98
2.11	Knowledge Gap and Research Contribution	99
2.11.1	Theoretical Gap	99
2.11.2	Geographical Gap.....	101
2.11.3	Contextual Gap.....	103
2.11.4	Temporal Gap.....	105
2.11.5	Methodological Gap.....	106
2.11.6	Population Gap.....	107
2.12	Conceptual Framework and Hypotheses Development	108
2.12.1	Background of Study Model	108
2.12.2	Social Presence Components and Knowledge Sharing.....	112
2.12.2.1	Relation Building and Knowledge Sharing	112

2.12.2.2 Trust and Knowledge Sharing	113
2.12.2.3 Cohesion and Knowledge Sharing.....	114
2.12.2.4 Communication and Knowledge Sharing	114
2.12.3 Virtual Leadership and Knowledge Sharing.....	116
2.12.4 Knowledge Sharing and Virtual Team Performance	117
2.12.5 Social Presence Components and Virtual Team Performance.....	118
2.12.5.1 Relationship Building and Virtual Team Performance	119
2.12.5.2 Cohesion and Virtual Team Performance.....	119
2.12.5.3 Trust and Virtual Team Performance	120
2.12.5.4 Communication and Virtual Team Performance	121
2.12.6 Virtual Leadership and Virtual Team Performance	123
2.12.7 Social Presence, Knowledge Sharing, and Virtual Team Performance.....	125
2.12.8 Virtual Leadership, Knowledge Sharing, and Virtual Team Performance.....	126
2.12.9 Social Presence, Media Richness, and Virtual Team Performance.....	128
2.12.10 Virtual Leadership, Media Richness, and Virtual Team Performance	130
2.13 Chapter Summary	132
CHAPTER THREE: RESEARCH METHODOLOGY	134
3.1 Introduction	134
3.2 Research Philosophy	134
3.3 Research Paradigm.....	135
3.4 Approach of the Theory Development.....	136
3.5 Research Design.....	137
3.5.1 Methodological Choice	138
3.5.2 Research Strategies.....	138
3.5.3 Time Horizon	140
3.5.4 Data Collection.....	140
3.5.4 Type of Investigation.....	141
3.5.5 Purpose of Research	141
3.6 Sampling Process	143
3.6.1 Population of the Study	143
3.6.2 Sample Frame.....	145
3.6.3 Sampling Design	151
3.6.4 Sample Size	153
3.6.5 Unit of Analysis	153
3.6.6 Sampling Procedure	154
3.7 Research Instrument.....	156
3.7.1 Research Instrument Design	156
3.7.2 Research Instrument Validity.....	162
3.7.3 Pilot Study and Research Instrument Reliability	164
3.8 Chapter Summary.....	166

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION.....	167
4.1 Introduction	167
4.2 Data Collection Results.....	167
4.2.1 Research Ethics Approval	167
4.2.2 Participant Recruitment	169
4.2.3 Informed Consent	170
4.2.4 Self-Administered Survey Arrangement	171
4.2.5 Data Collection Procedures	172
4.2.6 Data Keeping and Storage	174
4.2.7 Data Analysis	175
4.2.7.1 Analysis Tools	175
4.2.7.2 Data Analysis Procedures	175
4.2.7.3 Justifications for Using SEM.....	176
4.3 Data Screening	176
4.3.1 Missing Values	177
4.3.2 Outliers Values	179
4.4 Statistical Assumptions	182
4.4.1 Normality.....	183
4.4.2 Homoscedasticity	185
4.4.3 Linearity	186
4.4.4 Multicollinearity	188
4.4.5 Absence of Correlated Errors	189
4.5 Reliability Test.....	189
4.6 Descriptive Analysis	191
4.6.1 Distribution of Study Sample	191
4.6.2 Distribution of Demographic Diversity.....	193
4.6.3 Distribution of Cultural Diversity	194
4.6.4 Team Diversity	195
4.6.5 Descriptive Analysis of the Study Variables.....	197
4.7 Exploratory Factor Analysis	198
4.7.1 Assessment of the Suitability of the Data for Factor Analysis....	199
4.7.1.1 Sample Size.....	199
4.7.1.2 Association among the Variables.....	200
4.7.2 Factor Extraction	201
4.7.2.1 Latent Root Criterion (Kaiser's Criterion).....	202
4.7.2.2 A Priori Criterion	203
4.7.2.3 Scree Test Criterion (Catell's Scree Test)	203
4.7.2.4 Percentage of Variance Criterion.....	204
4.7.3 Factor Rotation and Interpretation.....	205
4.7.4 Assessing Factor Loadings and Communalities of the Variables.....	206
4.7.5 Results of EFA	207
4.8 Confirmatory Factor Analysis Of Social Presence	210
4.8.1 Model Specification	212
4.8.2 Model Identification	213
4.8.3 Model Estimation	215
4.8.4 Model Testing.....	216
4.8.4.1 Absolute Fit Indices	217
4.8.4.1.1 Chi-Square GOF	217

4.8.4.1.2	Degrees of Freedom (DF)	218
4.8.4.1.3	Normed Chi-Square	218
4.8.4.1.4	Goodness-of-Fit Index (GFI)	218
4.8.4.1.5	Root Mean Square Error of Approximation (RMSEA).....	219
4.8.4.1.6	Root-Mean-Square Residual Index (RMR) ...	219
4.8.4.2	Incremental Fit Indices (Comparative Fit Indices)	221
4.8.4.2.1	The Normed Fit Index (NFI).....	221
4.8.4.2.2	The Tucker Lewis Index (TLI)	222
4.8.4.2.3	The Comparative Fit Index (CFI)	222
4.8.4.3	Parsimony Fit Indices	223
4.8.4.3.1	The Adjusted Goodness-of-Fit Index (AGFI)	224
4.8.4.3.2	The Parsimony Normed Fit Index (PNFI)	224
4.8.4.3.3	Akaike Information Criterion (AIC).....	225
4.8.5	Model Modification.....	226
4.8.5.1	Standardized Residuals	226
4.8.5.2	Modification Indices	228
4.8.5.3	Specification Searches	231
4.9	Confirmatory Factor Analysis of Pooled Model	232
4.9.1	Model Specification	232
4.9.2	Model Identification	235
4.9.3	Model Estimation	235
4.9.4	Model Testing.....	236
4.9.4.1	Absolute Fit Indices	236
4.9.4.2	Incremental Fit Indices	237
4.9.4.3	Parsimony Fit Indices	238
4.9.5	Model Modification.....	239
4.9.5.1	Standardized Residuals	239
4.9.5.2	Modification Indices	239
4.9.5.3	Specification Searches	242
4.9.6	Validity of CFA Model	243
4.9.6.1	Content Validity.....	244
4.9.6.2	Nomological Validity.....	245
4.9.6.3	Construct Validity	246
4.9.6.3.1	Convergent Validity.....	246
4.9.6.3.2	Discriminant Validity.....	250
4.10	Path Analysis.....	251
4.10.1	Model Specification	251
4.10.2	Model Identification	253
4.10.3	Model Estimation	253
4.10.4	Model Testing.....	254
4.10.4.1	Absolute Fit Indices	254
4.10.4.2	Incremental Fit Indices	255
4.10.4.3	Parsimony Fit Indices	255
4.10.5	Model Modification.....	256
4.10.5.1	Standardized Residuals	256
4.10.5.2	Modification Indices	257
4.11	Testing Research Hypothesis	259

4.11.1 Testing Hypothesis 1	261
4.11.2 Testing Hypothesis 2	262
4.11.3 Testing Hypothesis 3	262
4.11.4 Testing Hypothesis 4	263
4.11.5 Testing Hypothesis 5	264
4.12 Mediating Test of the Knowledge Sharing	265
4.12.1 Testing Hypothesis 6	265
4.12.2 Testing Hypothesis 7	266
4.13 Moderating Testing of Media Richness	267
4.13.1 Testing Hypothesis 8	267
4.13.2 Testing Hypothesis 9	270
4.14 Chapter Summary.....	274
CHAPTER FIVE: DISCUSSIONS AND CONCLUSION AND RECOMMENDATIONS.....	275
5.1 Introduction.....	275
5.2 Discussion of Findings.....	275
5.2.1 Discussion of Research Question 1	275
5.2.2 Discussion of Research Question 2	277
5.2.3 Discussion of Research Question 3	278
5.2.4 Discussion of Research Question 4	279
5.2.5 Discussion of Research Question 5	280
5.2.6 Discussion of Research Question 6	282
5.2.7 Discussion of Research Question 7	283
5.2.8 Discussion of Research Question 8	286
5.2.9 Discussion of Research Question 9	288
5.3 Contribution On Theoretical Level	289
5.4 Contribution On the Practical Level	291
5.5 Contribution On the Policy Makers Level	294
5.6 Research Limitations and Recommendations	295
5.7 Chapter Summry	297
REFERENCES.....	299
APPENDIX 1: REQUEST FOR PERMISSION TO DISTRIBUTE THE QUESTIONNAIRES.....	325
APPENDIX 2: STUDY PROTOCOL.....	326
APPENDIX 3: QUESTIONNAIRE.....	328
APPENDIX 4: SAMPLE 1 OF INFORMED CONSENT TO COLLECT DATA.....	336
APPENDIX 5: SAMPLE 2 OF INFORMED CONSENT TO COLLECT DATA.....	337
APPENDIX 6: SAMPLES OF DATA COLLECTION	338
APPENDIX 7: SAMPLES OF RESEARCH INSTRUMENT VALIDATION	342
APPENDIX 8 ABSTRACT VERIFY	357

LIST OF TABLES

Table 1.1	Types of HEIs in Malaysia	9
Table 1.2	Malaysian Universities Ranking on QS	11
Table 2.1	Working Environment between Traditional and Virtual Paradigm	33
Table 2.2	Virtual Team Definition	36
Table 2.3	Characteristics of Local and Global Virtual Teams	38
Table 2.4	Virtual Teams According to Geographical Distribution	39
Table 2.5	Virtual Teams According to Communication	40
Table 2.6	Type of Virtual Team Adopted in this Study	41
Table 2.7	Definition of Virtual Team Performance in Prior Literature	47
Table 2.8	Measures of Virtual Team Performance in Prior Literature	49
Table 2.9	Factors Affecting Performance of Virtual Team 2015-2021	52
Table 2.10	Categories of Factors Affecting Virtual Team Performance 2015-2021	54
Table 2.11	Matrix of the Hersey-Blanchard Model Maps	77
Table 2.12	Prior Empirical Studies of SP Practices (RB) and KSh	84
Table 2.13	Prior Empirical Studies of SP Practices (TR) and KSh	85
Table 2.14	Prior Empirical Studies of SP Practices (Coh) and KSh	86
Table 2.15	Prior Empirical Studies of SP Practices (Com) and KSh	87
Table 2.16	Prior Empirical Studies of VL and KSh	88
Table 2.17	Prior Empirical Studies of KSh and VTP	89
Table 2.18	Prior Empirical Studies of SP Practices (RB) and VTP	90
Table 2.19	Prior Empirical Studies of SP Practices (Tr) and VTP	91
Table 2.20	Prior Empirical Studies of SP Practices (Coh) and VTP	92

Table 2.21	Prior Empirical Studies of SP Practices (Com) and VTP	93
Table 2.22	Prior Empirical Studies of VP and VTP	95
Table 2.23	Prior Empirical Studies of SP Practices and VTP, KSh	96
Table 2.24	Prior Empirical Studies of VL and VTP, KSh	97
Table 2.25	Prior Empirical Studies of SP Practices, VTP and MR	98
Table 2.26	Prior Empirical Studies of VL, VTP and MR	98
Table 2.27	Matrix of Research on Virtual Team in the Services Context	104
Table 2.28	Previous Studies on VTP by Study Population	108
Table 2.29	Summary of the Study Hypotheses	132
Table 3.1	Types of HEIs in Malaysia	144
Table 3.2	Public Universities in Malaysia	145
Table 3.3	Private Universities in Malaysia	146
Table 3.4	Private University-Colleges in Malaysia	148
Table 3.5	International Branch Campuses in Malaysia	150
Table 3.6	Sources of Research Variables Measurement	157
Table 3.7	Measurement Items in Research Instrument	160
Table 3.8	Face Validity of the Study Instrument	163
Table 3.9	Reliability Test of Study Instrument	165
Table 4.1	Criteria that must be met by Study Participants	170
Table 4.2	Status of Distributed Questionnaires	172
Table 4.3	Responses from Malaysian-Targeted Universities	173
Table 4.4	Distributing Questionnaires to Top-Ten Malaysian Universities	174
Table 4.5	Missing Data in Questionnaires Distributed by University	179
Table 4.6	Types of Outliers and the Method of Treatment	180
Table 4.7	Univariate Outlier Method Test Results	182
Table 4.8	Normality Distribution Testing Results	184
Table 4.9	Collinearity Test Result by TOL and VIF	188

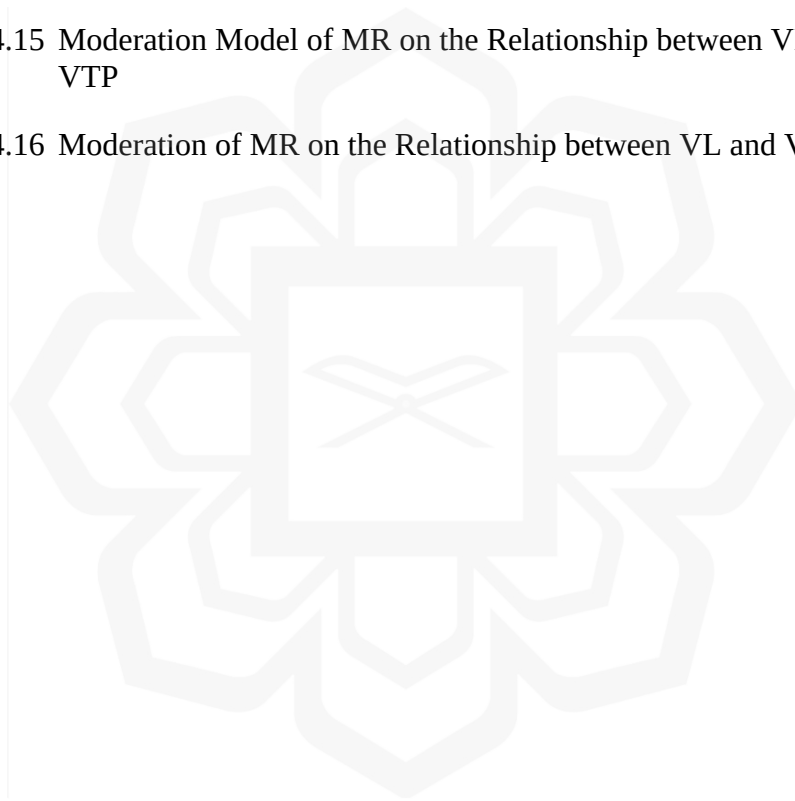
Table 4.10 Reliability Test	190
Table 4.11 Distribution of the Study Sample by Malaysian Universities	191
Table 4.12 Distribution of Demographic Diversity	193
Table 4.13 Distribution of Cultural Diversity at the Surface Level	194
Table 4.14 Team Diversity	196
Table 4.15 Descriptive Analysis of the Study Variables	197
Table 4.16 KMO and Bartlett's Test KMO and Bartlett's Test	201
Table 4.17 Factor Extraction According to Latent Root Criterion	202
Table 4.18 Guidelines for Identifying Significant Factor Loadings	206
Table 4.19 EFA Results of Study Component	209
Table 4.20 GOF of Absolute Measures of Social Presence	220
Table 4.21 GOF of Incremental Measures of Social Presence	223
Table 4.22 GOF of Parsimony Measures of Social Presence	225
Table 4.23 GOF of Absolute Measures in the Final CFA Model of SP	229
Table 4.24 GOF of Incremental Measures in the Final CFA Model of SP	230
Table 4.25 GOF of Parsimony Measures in the Final CFA Model of SP	230
Table 4.26 Model Specification after EFA	233
Table 4.27 GOF of Absolute Measures in the Initial CFA Model	236
Table 4.28 GOF of Incremental Measures in the Initial CFA Model	237
Table 4.29 GOF of Parsimony Measures in the Initial CFA Model	238
Table 4.30 GOF of Absolute Measures in the Final Pooled CFA Model	240
Table 4.31 GOF of Incremental Measures in the Final Pooled CFA Model	241
Table 4.32 GOF of Parsimony Measures in the Final Pooled CFA Model	242
Table 4.33 Convergent Validity of CFA Model	248
Table 4.34 Discriminant Validity of CFA Model	251
Table 4.35 GOF of Absolute Measures in the Initial SEM Model	254
Table 4.36 GOF of Incremental Measures in the Initial SEM Model	255

Table 4.37 GOF of Parsimony Measures in the Initial SEM Model	255
Table 4.38 GOF of Absolute Measures in the Final SEM Model	258
Table 4.39 GOF of Incremental Measures in the Final SEM Model	258
Table 4.40 GOF of Parsimony Measures in the Final SEM Model	259
Table 4.41 Regression Path Coefficient Weights	260
Table 4.42 Standardized Regression Weights	260
Table 4.43 Testing Hypothesis -1	261
Table 4.44 Testing Hypothesis -2	262
Table 4.45 Testing Hypothesis -3	263
Table 4.46 Testing Hypothesis -4	264
Table 4.47 Testing Hypothesis -5	265
Table 4.48 Testing Hypothesis -6	266
Table 4.49 Testing Hypothesis -7	267
Table 4.50 Testing Hypothesis-8	269
Table 4.51 Testing Hypothesis-9	272
Table 4.52 Summary of Research Findings	274
Table 5.1 Developing a Theoretical Framework	293

LIST OF FIGURES

Figure 1.1	Research Framework	21
Figure 2.1	The Position of Virtual Teams in a Virtual HR Environment	31
Figure 2.2	Distribution of Publications on the Virtual Teams by Years	34
Figure 2.3	Factors Affecting Virtual Teams Performance 2015-2021	58
Figure 2.4	Social Presence Levels according to Media Richness	74
Figure 2.5	Situational Leadership Model by Arvidsson <i>et al.</i> (2007)	76
Figure 2.6	Social Exchange Theory	80
Figure 2.7	Media Richness Theory	82
Figure 2.8	Conceptual Framework in the Current Study	100
Figure 2.9	Distribution of Publications on the VTP by Country	102
Figure 2.10	Distribution of Publications on the VTP by Sector	104
Figure 2.11	Publications on the Virtual Team Performance by Year	106
Figure 2.12	Conceptual Framework of the Present Study	110
Figure 3.1	Difference between Inductive and Deductive Approach.	137
Figure 3.2	Research Design of the Current Study	142
Figure 3.3	Types of HEIs in Malaysia	144
Figure 3.4	Flow of Task in Sampling Based on Sekaran and Bougie (2013)	156
Figure 3.5	Research Philosophy and Research Design	166
Figure 4.1	Data Analysis Processes in the Current Study	176
Figure 4.2	Graphical Tests for Homoscedasticity	186
Figure 4.3	Linearity Test Result by Applied Scatterplot	187
Figure 4.4	Distribution of the Study Sample by the Malaysian Universities	192
Figure 4.5	Scree Test Criterion	204
Figure 4.6	Model Specification of SP Components (Second Order)	213

Figure 4.7	Standardized Residual Covariances (Second Order)	227
Figure 4.8	Final CFA of Social Presence Components	229
Figure 4.9	CFA of Initial Pooled Model	235
Figure 4.10	Final Pooled CFA Model	240
Figure 4.11	SEM Initial Model	253
Figure 4.12	SEM Final Model	257
Figure 4.13	Moderation Model of MR on the relationship between SP and VTP	268
Figure 4.14	Moderation of MR on the Relationship between SP and VTP	270
Figure 4.15	Moderation Model of MR on the Relationship between VL and VTP	271
Figure 4.16	Moderation of MR on the Relationship between VL and VTP	273



LIST OF ABBREVIATIONS

(AIC)	Akaike Information Criterion
(AMOS)	Analysis of Moment Structures
(AVE)	Average Variance Extracted
(BERNAMA)	Berita Nasional Malaysia
(B2B)	Business-to-Business
(CFA)	Confirmatory Factor Analysis
(Com)	Communication
(Coh)	Cohesion
(CFI)	Comparative Fit Index
(CR)	Critical Ratio
COVID-19	Coronavirus Disease 2019
(CMIN)	Chi-Square Minimum
(DOSM)	Department of Statistics of Malaysia
(EMGS)	Education Malaysia Global Services
(EFA)	Exploratory Factor Analysis
(FA)	Factor Analysis
(F2F)	Face to Face
(KENMS)	Faculty of Economics and Management Sciences
(GOF)	Goodness-of-Fit
(GFI)	Goodness-of-Fit Index
(GDP)	Gross Domestic Product
(GVT)	Global Virtual Team
(GLS)	Generalised Least Squares
(HEIs)	Higher Education Institutions
(HRD)	Human Resources Development
(IREC)	IIUM Research Ethics Committee
(IIUM)	International Islamic University Malaysia
(ICT)	Information and Communication Technology
(IT)	Information Technology
(KMSs)	Knowledge Management Systems
(K.Sh)	Knowledge Sharing
(KMO)	Kaiser-Meyer-Olkin
(KPI)	Key Performance Indicators
(MQA)	Malaysian Qualifications Agency
(MHE)	Ministry of Higher Education in Malaysia
(MEBHE)	Malaysia Education Blueprint Higher Education
(MNVVT)	Multinational Virtual Teams
(MR)	Media Richness
(MRT)	Media Richness Theory
(MENA)	Middle East and North Africa
(ML)	Maximum Likelihood
(MSU)	Management and Science University
(MARC)	Mean Absolute Residual Covariance
(MSV)	Mean Shared Variation
(MCO)	Mobility Control Order

(NFI)	Normed Fit Index
(NNFI)	Non-Normed Fit Index
(NHESP)	National Higher Education Strategy
(OECD)	Organisation for Economic Cooperation and Development
(PCA)	Principal Components Analysis
(PNFI)	Parsimony Normed Fit Index
(PR)	Parsimony Ratio
(QS)	Quacquarelli Symonds
(RMR)	Root-Mean-Square Residual Index
(SRMR)	Root Mean Square Residual Standardised
(RMSEA)	Root Mean Square Error of Approximation
(RMC)	Research Management Centre
(RB)	Relation Building
(SLT)	Situational Leadership Theory
(SET)	Social Exchange Theory
(SPT)	Social Presence Theory
(SP)	Social Presence
(SPSS)	Statistical Package for Social Science
(SEM)	Structural Equations Modeling
(TR)	Trust
(TOL)	Tolerance
(TLI)	Tucker-Lewis Index
(UM)	Universiti Malaysia
(UPM)	Universiti Putra Malaysia
(UKM)	Universiti Kebangsaan Malaysia
(USM)	Universiti Sains Malaysia
(UTM)	Universiti Teknologi Malaysia
(UUM)	Universiti Utara Malaysia
(UCSI)	UCSI University
(UTP)	Universiti Teknologi Petronas
(ULS)	Unweighted Least Squares
(VL)	Virtual Leadership
(VT)	Virtual Teams
(VTP)	Virtual Team performance
(VHR)	Virtual Human Resources
(VHRD)	Virtual Human Resources Development
(VPDT)	Virtual Partially Distributed Team
(VIF)	Variance Inflation Factor
(WFH)	Work From Home

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Virtual teams' performance is one of the most common practices in the context of Virtual Human Resources Development (VHRD), which has attracted attention recently due to the advancement of communication media, and the increasing need for it in light of the crises that the world is going through such as the Coronavirus Disease 2019 (COVID-19) and beyond. There are many factors influencing virtual teams' performance such as the social presence behavior of team members such as relation building, trust, cohesion, and communication. In addition to the critical role played by virtual leadership in addressing the challenges facing team members. Furthermore, knowledge sharing between virtual team members and the media richness used in virtual work emerged as the factors commonly investigated in the context of virtual human resources.

Statistics indicate the increasing importance of virtual teams in the organisations. For instance, many international companies have been able to achieve remarkable success by employing virtual teams in their business such as Xerox, General Motors, Hewlett-Packard, Procter and Gamble, and General Mills (Soon & Salamzadeh, 2020). Furthermore, prior studies have stated that by 2028, 73% of employees will work remotely, this indicates the increasing importance of implementing virtual teams in organizations (Mutha & Srivastava, 2023; Lister, 2020; Alkoud *et al.*, 2023b). In addition, around five years ago, estimates suggested that 20–25% of white-collar workers in Organisation for Economic Cooperation and Development (OECD) nations had experience working in Global Virtual Teams (GVT) across borders and that between 50–70% of them had virtual teaming experience (Zander *et al.*, 2021). Thus, one of the key strategies in the field of human resource management in the future will be the Work From Home (WFH) strategy, it has caused a sharp rise in the number of virtual teams (Othman *et al.*, 2021; Vahdat, 2022; El Idrissi & Fourka, 2022; Mahtta *et al.*, 2022).

Social presence factors such as relationship building, trust, cohesion and communication among virtual team members are the most important social factors influencing virtual team performance (Ben Sedrine *et al.*, 2020; Singh *et al.*, 2021). Notably, members of a team that have a low social presence may perform worse because they ignore or postpone important remarks or information. Reduced social signals from poor social presence are likely to result in less interaction and reciprocity, which are necessary for high-quality communication (Loode, 2021; Jang & Choi, 2022). Social presence could mitigate the consequences of face-to-face interaction deficits or even outweigh them (Almahdi *et al.*, 2023). Moreover, the study by Bickle *et al.* (2019) indicates that in a virtual human resource development environment, there is a need to provide an appropriate social environment to facilitate communication, build trust, enhance cohesion, and increase a sense of belonging.

Virtual leadership plays a crucial role in facing the challenges that impede enhancing the performance of virtual teams and thus achieving the goals of organizations, which ensures their continuity and survival (Elyousfi *et al.*, 2021a; Chaudhary *et al.*, 2022; Mayer *et al.*, 2023). The novel concept in leadership, known as Electronic Leadership or Virtual Leadership, represents a radical shift in the way a leader functions both inside and outside of the business. It is not merely an adjunct to traditional leadership (Butt *et al.*, 2022). Social distancing agreements have compelled organizations to embrace virtual working vigorously, which has hastened the transformation during COVID-19 (Mysirlaki & Paraskeva, 2020; Elyousfi *et al.*, 2021a). But even in the wake of COVID-19, the majority of businesses are now choosing to alternate between office-based and virtual employment during the workday. Focusing on a leadership role inside the virtual team is crucial to spearheading this major shift in an era where businesses and organizations are changing quickly (Mutha & Srivastava, 2021; Elyousfi *et al.*, 2021a). With the growing use of virtual teams in businesses and organizations, it is essential to comprehend how virtual leaders work (Ben Sedrine *et al.*, 2020; Butt *et al.*, 2022). Long-term research has focused on the significance of leadership roles in the increasingly complicated higher education environment. However, studies on how virtual team leadership affects virtual team performance are scarce (Butt *et al.*, 2022).

Knowledge sharing is a crucial component of virtual teams. Human Resource Development (HRD) specialists are essential in creating and maintaining knowledge sharing platforms, which are essential components of virtual teams and boost employee performance (Swanson *et al.*, 2020), to be able to solve complicated issues and make judgments, information sharing is required (Majzoub *et al.*, 2020a). According to earlier research, if given the right support and time, virtual teams might cooperate more successfully than traditional teams (Singh, 2021). Moreover, the manner in which virtual teams interact is different from how Face to Face (F2F) teams do, virtual teams communicate with one another via Information and Communications Technology (ICT). Sharing knowledge can help understand how virtual teams are formed and how they work, it can also help create productive virtual teams by maintaining team collaboration and cohesion (AlKaabi *et al.*, 2022). Knowledge sharing and collaborative exchanges become significant areas of research in the contemporary technical and informational climate within higher education as technology encourages simple access to information via smartphones, tablets, and other devices (Singh, 2021).

Media richness has a key role in the virtual work environment. The ability of organizations to employ technology in the performance of their activities has become a decisive factor in the success and continuity of organizations (Yaghmai & Bøe, 2021). Reliance on technology in institutions and companies has increased significantly in recent decades (Al Majzoub *et al.*, 2020). For instance, Kannan and Garad (2020) indicated that statistics reveal that 33% of the global industrial economy employs high technology, and it is expected that the percentage will rise to 72% within five years. ICTs have had a major impact on the way organizations operate, this change included all functions of organizations such as management, production, marketing, controlling, purchasing, selling, and operations (Matli, 2020; Mayer *et al.*, 2020; Pokhrel & Chhetri, 2021; Adiloğlu *et al.*, 2021).

During crises, organizations increasingly need to rely on virtual teams that can use ICT to deliver services through virtual space to ensure the survival, continuity, and safety of their employees (Zaharie, 2021a). COVID-19 is one example of the crisis that showed the urgent need for organizations to use ICT in their activities. At

the beginning of 2020, COVID-19 swept the world, and most organizations operating traditionally were forced to transfer their activities to virtual space due to quarantine and the imperatives of social distancing (Caligiuri *et al.*, 2020; Matli, 2020; Zeuge *et al.*, 2020; Newman & Ford, 2021). The study by Bartsch *et al.* (2020) indicates that since the beginning of the spread of COVID-19, companies, and institutions that provide basic services such as health services, logistics, food resources, education, financial institutions, and the media have had to continue to provide their services, but they had to provide their services in a different way to maintain the safety of their employees and customers. Therefore, these companies and institutions had to create a virtual work environment to continue providing their services. After COVID-19, despite the post-pandemic shift, a lot of businesses continued to use virtual teams and hybrid work arrangements (Ab Wahab *et al.*, 2023).

Virtual work is one of the advanced methods that organizations use in performing their activities during crises to ensure their survival and continuity (Henry *et al.*, 2021; Topaloglu & Anac, 2021; Ab Wahab *et al.*, 2023). The study of Baynum (2021) indicated that after the spread of COVID-19 in 2020, business owners did not need to allocate a place for their office employees to perform their work but asked them to work directly from home. It was essential for corporate employees to use ICT such as Microsoft Teams, Sales Force, Slack, and WeChat to ensure that all team members communicate with each other and with their organizations and companies. According to Caligiuri *et al.* (2020), in a study after COVID-19, conducted with executives in the human resources management department, it was found that 80% of organizations asked their employees to WFH. In USA, Since March 11, 2020, the number of Americans who work solely from home has surged due to COVID-19, rising from 8.2% in February 2020 to 35.2% in May 2020 (Yang *et al.*, 2023). According to the International Labor Organization, approximately 81% of the global workforce has been affected by lockdown tactics (Sakarji *et al.*, 2023). Moreover, poll of 229 Human Resources (HR) departments, approximately half of the organizations had more than 80% of their staff working from home during the early stages of the COVID-19 pandemic (Daud *et al.*, 2020).

In Malaysia, the economy was affected during COVID-19, but the damages differed from one sector to another. In 2020, the Malaysian Employers' Federation additionally indicated that COVID-19 will cause two million people to lose their jobs and the unemployment rate will rise to between 10% and 15% (Kamaruddin *et al.*, 2020). Malaysia's government has implemented remote laws due to the country's significant devastation (Osman *et al.*, 2020; Ishak *et al.*, 2022; Chan *et al.*, 2022). In Malaysia, remote has gained popularity after the Mobility Control Order (MCO) was released in March 2020 (Osman *et al.*, 2020; Sulaiman & Effendi, 2022; Sakarji *et al.*, 2023; Subramaniam *et al.*, 2021; Othman *et al.*, 2021). In Malaysia, the practice of virtual work expanded dramatically during MCO (Sulaiman & Effendi, 2022; Nabi *et al.*, 2020; Ibrahim *et al.*, 2021). Within this scenario, the importance of virtual teams emerged as a quick and flexible solution to the survival of institutions and companies, and to ensure their survival in the circle of competition.

Higher education sector employees in Malaysia have been asked to WFH virtually after COVID-19, like other Malaysian sectors. All Higher Education Institutions (HEIs) in Malaysia have been directed by the Ministry of Higher Education (MHE) to perform academic activities remotely due to the COVID-19 pandemic. While it wasn't always possible for some industries, particularly the education sector, however, it is now the norm. It has been recommended that Malaysian employees work remotely (Ishak *et al.*, 2022; Sulaiman & Effendi, 2022). Every academician at the 20 public institutions and the more than 85 private universities in Malaysia was able to quickly adjust to working from home (Subramaniam *et al.*, 2021). Because business continuity is essential to the survival of many Malaysian organizations, especially HEIs, employers and management must devise strategies that enable employees to carry out their tasks from a distance. Remote work is a realistic and feasible working option (Sulaiman & Effendi, 2022).

However, there are many challenges to implementing virtual teams in organizations at the level of theory, policy, and practice.

Firstly, at the theoretical level, theories that explain the work of virtual teams within organizations and how to improve their performance are still rare, studies and

research on virtual teams, their tasks, and their role in the success of organizations are still few, especially empirical studies. Elyousfi *et al.* (2021) argued that research on virtual teams is still in its early stages, and there is a need for more research on public institutions and more research on satisfaction and performance in virtual teams. In the same direction, Sagar *et al.* (2022) argued that COVID-19 forced the world to employ virtual teams, and it is important to study the challenges that weaken the effectiveness of the virtual team and that there is a lack of empirical studies on the performance of virtual teams.

Secondly, at the practical level, there is a high rate of failure of virtual teams in organizations. Statistics indicate a high rate of failure of virtual teams in performing their tasks. For instance, Clark *et al.* (2019) revealed that the failure rate of virtual teams has reached 71%, and crises may increase the failure rate, which indicates the need to identify the factors that lead to the success of virtual teams, and thus the success of organizations in survival and competition in light of crises. The sudden transition from the traditional method to the virtual method of working during the COVID-19 caused confusion for institutions and companies (Mysirlaki & Paraskeva, 2020). Organizations employ virtual teams to perform their tasks and goals, and this step has caused great confusion because the employees and administrators dealing with a work environment completely different from the traditional work environment, and here there is a need to study the factors affecting the performance of the virtual team to survive and compete (Mysirlaki & Paraskeva, 2020).

In Malaysia, the higher education sector was affected by the closure like other sectors, as all educational institutions faced challenges related to moving educational activities into cyberspace (Sia & Abbas Adamu, 2020). Indeed, Sia and Adamu (2020) further commented that some HEIs in Malaysia were not ready, because the method of distance education is considered new and requires recent technologies and skills in the academic sector. Malaysian employees in MHEs are having trouble with their staff members' quality of work during this MCO restricted time (Sulaiman & Effendi, 2022). Hunter quoted research by Professor Geoffrey Williams, a former Deputy Vice-Chancellor at Universiti Tun Abdul Razak, in an April 2020 article, the report found that 44% of private higher education in Malaysia was in debt and that 55% of

the institutions were experiencing losses. The majority of these colleges and universities have had to rely on new funding or equity from their owners in order to survive (Osman *et al.*, 2020; Abdullah *et al.*, 2020). During COVID-19, there is much added uncertainty within the higher education sector in Malaysia (Abdullah *et al.*, 2020). Employees were forced to stay home during the pandemic situation in Malaysia. Everyone; organisational, society, and individuals face many difficulties and uncertainties forcing most people to concentrate on survival and competition. It has negatively impacted many industries around the industry in Malaysia including higher institutions (Nabi *et al.*, 2020).

Thirdly, at the policy level, in Malaysia, the competitiveness and sustainability of the higher education sector in Malaysia at the level of Asia and the world is a major concern for policymakers. During COVID-19, the Malaysian government has directed the adoption of remote work and the maintenance of social distancing in all sectors including the higher education sector (Ishak *et al.*, 2022). This is done by relying on virtual administration to ensure the continuity and survival of educational institutions in providing education services. There is little research on analyzing the impact of working from home virtually on job performance from a Malaysian perspective (Azlan *et al.*, 2020). The Malaysian government wants to evaluate the success of the remote work policy during the pandemic, to determine whether to encourage WFH rules or look for other options (Sulaiman & Effendi, 2022; Ishak *et al.*, 2022). Policymakers, particularly those in public university HR departments, need to be informed about the core issues behind the difficulties that staff members are currently facing while working from home (Othman *et al.*, 2021). This is crucial for universities so that upper management may investigate more thoroughly the problems associated with putting any kind of policy into place regarding employee productivity and measuring the university's annual Key Performance Indicators (KPI) (Othman *et al.*, 2021).

Malaysia's strategic vision in the higher education sector must include plans to confront crises and take advantage of the benefits of advanced technology to ensure that it remains competitive in the global education market even after crisis. Public HEIs, and private HEIs, also need to be able to react and adjust swiftly to the shifting

needs of the dynamic global community in order to satisfy the current social, political, and economic demands (Halid *et al.*, 2024). Malaysia has a number of challenges in the modern era of globalization. If Malaysia wants to realize its full development, it needs to improve the quality of its excellent education and become more competitive (Sandrasegaran & Rambeli, 2024).

Based on the foregoing, the main issue in this research is the application of theories that guide the formation of high-performance and successful virtual teams that help HEIs survive and continue. In particular, the problem of the current research is focused on testing the factors affecting the performance of virtual teams using the Social Presence Theory (SPT) by testing the four most important components of social presence in the study model such as (building relationships, trust, cohesion, and communication), in addition to testing the role of virtual leadership in enhancing the performance of virtual teams by facilitating the challenges facing virtual teams in the light of Situational Leadership Theory (SLT) that is suitable for unstable situations that organizations go through, such as crises. Knowledge sharing is also one of the factors highlighted in this study for its importance in the context of virtual teams in light of Social Exchange Theory (SET). Finally, this research seeks to evaluate media richness for its crucial role in the success of virtual teams by enhancing the social presence of the virtual team and enhancing its performance in light of the Media Richness Theory (MRT), in addition to its role in facilitating the impact of virtual leadership on the performance of the virtual team.

1.2 OVERVIEW OF THE MALAYSIAN HIGHER EDUCATION INDUSTRY

The Malaysian higher education sector is one of the vital sectors in the country, which is receiving increasing attention from decision-makers in the Malaysian government. Below the study takes a brief look at the higher education sector in Malaysia, the challenges it faces in Malaysian higher education during and after COVID-19, and what changes have taken place in the Malaysian higher education sector.

1.2.1 A Brief Overview of the Higher Education Sector in Malaysia

There are various kinds of Higher Education Institutions (HEIs) in Malaysia. In 2022, according to the Malaysian Qualifications Agency (MQA), HEIs include public universities, private universities, polytechnics, colleges, institutions, and university colleges. According to statistics provided by MQA in 2022, there are 900 public and private HEIs (this number includes all of each institution's branches), including international campuses of renowned American, British, Australian, and Irish universities. Table 1.1 shows the types of institutions of higher education in Malaysia.

Table 1.1 Types of HEIs in Malaysia

Types of Institutions of HEIs		Source
Public /Government Institution	University	(MQA,2022)
	Polytechnic	
	College/ Institution	
Private Institution	University	
	University Collage	
	College/ Institution	

Source: (MQA, 2022)

The Malaysian government has developed strategic plans to internationalize Malaysian higher education due to its important contribution to the Malaysian economy. An important strategic driver of Malaysia's higher education policy is the globalization of higher education. Currently, many students from the Middle East and South and Southeast Asia choose to study in Malaysia (Rahman & Singh, 2022). In 2007, MHE launched the National Higher Education Strategy (NHESP), which aims mainly to make Malaysia an international hub for excellence in transcendence. In 2015, MHE was merged with the Ministry of Education in Malaysia, and since then the ministry has begun to develop a plan for education in Malaysia from 2015–2025 known as Malaysia Education Blueprint Higher Education (MEBHE).

Statistics indicate the interest of decision-makers in Malaysia in the higher education sector in terms of the high level of government spending on education. As per the 2022 report by the Agency on Education Malaysia Global Services (EMGS), the government of Malaysia allocates approximately 5% of its Gross Domestic Product (GDP) towards education, a figure that surpasses both the global and regional averages. The Malaysian government supervises public and private HEIs, and seeks to be a regional hub for international students. According to Krishnaswamy *et al.* (2019), the statistics reveal that the Malaysian economy benefits from the higher education sector by about (7.9) billion RM, and is expected to reach (15.6) billion RM in 2020. Moreover, Malaysia's higher education industry has significantly boosted the country's GDP. The industry is predicted to boost Malaysia's GDP by more than RM16.3 billion by 2023. The government's emphasis on leveraging education as a major engine for economic growth and the development of a competent workforce is reflected in this statistic, which includes investments in research, innovation, and student support. This contribution is essential to the services sector, which still accounts for the majority of Malaysia's GDP (Malaysia's National Statistics Organisation, Budget 2024).

Both governmental and private HEIs in Malaysia are crucial to the country's economic development (Osman *et al.*, 2020). Moreover, HEIs have contributed significantly to Malaysia's journey towards development over the years (Dumanig & Symaco, 2020). According to data released by the MHE in 2019, the nation's revenue from tuition fees, living expenditures, and other services used by international students brought in an average of 7.2 RM billion annually (Amzat *et al.*, 2023). Datuk Mohd Ghazali Abas, secretary-general of the Education Ministry, states that the average annual cost of an international student studying in Malaysia is approximately 46,000 RM; if the international student is traveling with their family, this amount rises to 88,000 RM (Amzat *et al.*, 2023).

According to the QS World University Rankings 2024, Malaysia's higher education system is ranked among the best in Asia. This is the most recent ranking available. In particular, Malaysia is ranked sixth in the world for the number of universities featured in worldwide rankings and fifth in Asia for the number of listed programs. With 37 ranked topics. This development shows Malaysia's steadfast

dedication to developing into a hub for education in the region (QS World University Rankings, 2024). According to Singh (2021), Malaysia was ranked eleventh in the world in 2020 as the best destination for international students due to the high standard of its universities and the appropriate costs of study and living, as the cost of studying in Malaysia is around 9000 US dollars, including tuition, accommodation, living and airline tickets, compared to 17000 dollars in Australia and 35000 in the United States.

The education industry in Malaysia has achieved remarkable results in the internationalization of education. The study of Wan and Abdullah (2021) mentioned that the greater expansion of higher education in Malaysia towards the global market began with the issuance of Law No. 555 in 1996 (Private Higher Educational Institutions Act 1996), which allowed the establishment of private universities, after this law, HEIs in Malaysia spread rapidly. According to the Quacquarelli Symonds (QS) World University Rankings, Malaysia Higher Education (MHE) has 10 universities ranked among the top 500 in the world (with a total of 23 in the top 1,000). Table 1.2 shows the ranking of Malaysian universities according to the Quacquarelli Symonds (QS) World University Rankings (QS, 2024).

Table 1.2 Malaysian Universities Ranking on QS World University Ranking 2024

University	Subjects	Global Rank (2024)
Universiti Malaya (UM)	Engineering & Technology	Top 100
Universiti Malaya (UM)	Theology, Divinity & Religious Studies	Top 50
Universiti Sains Malaysia (USM)	Environmental Sciences	Top 100
Universiti Sains Malaysia (USM)	Chemical Engineering	Top 150
Universiti Putra Malaysia (UPM)	Agriculture & Forestry	Top 100
Universiti Teknologi Malaysia (UTM)	Civil & Structural Engineering	Top 150
Taylor's University	Hospitality & Leisure Management	Top 30

Source: (QS, 2024)

Public and private HEIs in Malaysia have been able to attract international students which have constituted a remarkable contribution to the Malaysian economy. Krishnaswamy *et al.* (2019) reveal that the number of international students in Malaysia has reached (120) thousand students, and (30) thousand students at the postgraduate level. By 2025, the Malaysian Higher Education (MHE) hopes to welcome 250,000 overseas students and establish itself as a hub for tertiary education with worldwide accreditation (Rahman & Singh, 2022).

Technology contributes to the development of higher education in Malaysia. Chan Ie Lyn and Muthuveloo (2019) have referred that the incorporation of technology into the operations of this organization has contributed to its high organizational performance. Chan and Muthuveloo (2019) further highlighted that, in the West, education that uses virtual reality has turned into reality, and likewise in Malaysia technology has been included in the Malaysian education system. There are more than 11 high-level institutions in Malaysia that offer more than half of their courses through the internet.

1.2.2 The Challenges of Malaysian Higher Education

Higher education in Malaysia has faced many challenges during the spread of COVID-19 in the country. This closure has caused huge losses to the Malaysian economy. The Malaysian economy has lost 63 billion RM since the start of COVID-19 in Malaysia in March 2020 (Sia & Abbas Adamu, 2020). These losses are huge and warn of great danger and push the Malaysian government to adopt new methods to ensure the continuity of organizations that provide basic services such as education. That is why the Malaysian government directed higher educational institutions to adopt WFH. Azlan *et al.* (2020) have explained that the higher education sector was affected by the closure, like other sectors and all educational organizations faced the challenge of transferring educational activities to the internet. Sia and Adamu (2020) commented that some institutions of higher education in Malaysia were unprepared, as the mode of virtual working is new and requires new skills.

The study of Sia and Abbas (2021) additionally indicates that Malaysia has adopted virtual work during the crisis in an attempt to provide effective higher education services through HEIs. New tools and methods have emerged to administer distance education and have become popular and used by most HEIs. These systems help universities and educational institutions manage the educational process with all its tasks and goals (Sia & Abbas, 2020). In 2020, the Malaysian news agency (Berita Nasional Malaysia) or (BERNAMA) indicated that one of the main challenges faced by administrators in the higher education sector in Malaysia during COVID-19 is their need to implement a virtual work management system and employ virtual teams to continue providing distance educational services.

There are many challenges faced by managing virtual work in HEIs in Malaysia, including; providing an environment for social presence for virtual team members. As well as employing an appropriate means of media communication between team members, as these means differ and vary in terms of their effectiveness, ease of use, and cost of use. In addition, there is a challenge to provide virtual leadership capable of overcoming difficulties for members of the virtual team to perform their duties. Finally, the challenge of sharing knowledge appears in virtual teams due to the importance of exchanging information among team members to solve complex problems and new conditions in the virtual work environment. The study below highlights these challenges:

Firstly, the social presence of virtual team members, such as building relationships between team members, communication, cohesion, and trust, are among the issues facing virtual work. Social presence factors have a major impact on the performance of virtual teams (Lin *et al.*, 2008; Alkoud *et al.*, 2023a). Social factors contribute to greater communication and interaction with virtual team members, which improves the performance of virtual teams (Bickle *et al.*, 2019). According to the study of Clark *et al.* (2019), which reviewed the articles on the factors affecting the performance of virtual teams, it was found that 4 out of 5 factors are social factors, which indicates the significant and decisive influence of social presence factors in improving the performance of virtual teams.

Secondly, the media richness of communication is another challenge in the virtual team. The adoption of appropriate and rich media for communication between employees in the distance education system is another problem facing HEIs due to the importance of the type of communication between employees to enhance social presence, and thus the performance of virtual teams (Azlan *et al.*, 2020). Malaysian universities responded to COVID-19 by adopting virtual administration to preserve the lives of employees, academics, and students, and also responded to the Malaysian government's orders to maintain social distancing (Tan *et al.*, 2020; Sia & Abbas, 2020). Higher education needs basic physical infrastructure for both traditional and virtual working environments. HEIs in Malaysia need to equip and update their e-infrastructures because the effectiveness of virtual working is based on effective virtual working infrastructures.

A research study at Universiti Teknologi MARA (UiTM) in Malaysia revealed that the use of appropriate online media contributes to improving academic performance (Shahibi and Ku Rusli, 2017). Besides having basic infrastructure, there is a need for adequate support. The problem with this type of media is that it is not possible to use all the functions of this medium for free. Instead, employees prefer to use the free version of it, which offers limited functionality (Azlan *et al.*, 2020). The speed of the internet affects the means of communication used between virtual team members. As a result of the weak internet, team members use less rich media such as email or conversation applications such as WhatsApp, which leads to a lower performance level for virtual team members according to the MRT theory (Tan *et al.*, 2019 and Gordon, 2017). It should be remembered that Learning is the goal and technology is just the environment (Azlan *et al.*, 2020).

Thirdly, virtual leaders who can manage remote work in HEIs are another critical issue for the success of virtual teams. Some Malaysian universities, such as Taylor University, have established an academic team with the task of qualifying employees to use electronic platforms, sharing resources, and online cooperation (Sia & Abbas, 2020). There is agreement among researchers that leading virtual teams is more difficult and challenging than traditional F2F teams (Liao, 2017). Moreover, COVID-19 showed the vital role of virtual leadership in public institutions to deal

with the new situation, and how the pandemic revealed virtual leadership is critical when it comes to challenges and complex problems (Elyousfi *et al.*, 2021). For virtual team leaders and managers, monitoring virtual team performance is essential throughout COVID-19 and the new normal because team members will be working from home and the office, it is still important to anticipate and handle virtual team concerns before they begin to negatively impact virtual team and HR performance (Mahtta *et al.*, 2022). Virtual leadership in virtual teams plays a key role in the efficiency of the team as well as it is considered the Big Five contributors to the efficiency of the team (Ben Sedrine *et al.*, 2020).

As demonstrated, there are several types of challenges higher education sector in Malaysia, it is represented in adopting new management systems for education and maintaining the survival of Malaysian educational institutions in international competition in the education sector in light of technological development and in light of crises.

1.3 PROBLEM STATEMENT

At the global level, the performance of virtual teams is one of the issues that has received increasing attention in recent years. Elyousfi *et al.* (2021) contended that the field of study on virtual teams is still in its infancy and that additional research on public institutions as well as satisfaction and performance in virtual teams is needed. Similarly, Sagar *et al.* (2022) contended that COVID-19 compelled organizations worldwide to use virtual teams; that there is a dearth of empirical research on virtual team performance; and that it is critical to examine the obstacles that reduce the virtual team's efficacy. Little research has been done on virtual team performance and obstacles, and how little has been done to address or resolve the management issues that the virtual team itself raises (Winter, 2020). Furthermore, the administration faces difficulties in forming high-performance virtual teams due to insufficient guidance and studies on established effective virtual teams (Bhat *et al.*, 2017; Sagar *et al.*, 2022). Tracking virtual team performance is essential for virtual team leaders and managers during COVID-19 and beyond the new normal because team members will

be working from home and the office (Mahtta *et al.*, 2022). For instance, in India, according to research published in April 2020, over 70% of Indian corporate organizations feel that a primary concern with extended Work from Home (WFH) is a decrease in productivity (Osman *et al.*, 2020). Hence, in this new normal, with more virtual teams operating from different locations, research on virtual team's performance and human resource performance has become essential (Mahtta *et al.*, 2022).

In Malaysia, virtual work has not received much research, and Malaysian employee in Malaysia Higher Education (MHE) sectors are having trouble with their staff members' quality of work during this Movement Control Order (MCO) restricted time (Sulaiman & Effendi, 2022). Workplace culture in Malaysia has changed dramatically as a result of COVID-19, necessitating a dramatic change in how people interact and work in the workplace (Ibrahim *et al.*, 2021). This change could influence productivity, hence maintaining work productivity is required as a performance outcome (Ibrahim *et al.*, 2021). Although employees in the education sector in Malaysia have to adapt to a virtual work environment during the COVID-19 period, it is assumed that they will maintain their performance (Suriyani *et al.*, 2023; Othman *et al.*, 2021). For instance, in a study conducted at Universiti Teknologi MARA (UiTM), it was found that among employees, 17.7% of administrative employees did not fulfill their daily tasks (Othman *et al.*, 2021). However, there is no sufficient empirical research on the level of performance and productivity in Malaysian universities during or after COVID-19. Employers now face additional difficulties in obtaining and measuring the outcome from each employee engaged in virtual WFH (Othman *et al.*, 2021).

Research suggests that despite virtual teams being used more and more in organizations, the failure rate of a virtual team is very high. More research is needed to clarify how to solve this problem. For more details on this issue, the current study reviews previous studies as follows:

On the first hand, statistics indicate that it is increasingly important to employ virtual teams in organizations and institutions, for example; 73% of workers will work

remotely by 2028, which highlights the growing significance of creating virtual teams in enterprises (Mutha & Srivastava, 2023; Lister, 2020; Alkoud *et al.*, 2023b). Additionally, around five years ago, estimates indicated that between 50% and 70% of white-collar professionals in OECD countries had experience working in GVTs across borders (Zander *et al.*, 2021; Alkoud *et al.*, 2023b). Furthermore, according to Gupta and Pathak (2018), virtual teams are now used in organizations of all sizes and types, and it is thought that 60% of multinational corporations already utilize virtual teams, and that number is expected to increase to 80% in the future. Moreover, according to Caligiuri *et al.* (2020), it was discovered that 80% of firms asked their workers to WFH in recent research performed with executives in the human resources management department in March 2020 following COVID-19.

On the other hand, there are studies indicating a high failure rate for virtual teams. For instance, the research by Clark *et al.*, published in 2019, shows that virtual teams fail at a rate of 71% despite having several benefits. Other studies indicated that the number of virtual teams in business is increasing exponentially, however, virtual leaders face a high failure rate of virtual teams that reaches 80% (Gilbert, 2022). WFH in the virtual method should maintain the same level of output or efficiency as F2F method, however, virtual work might result in a decline in productivity and pose a long-term threat to economic expansion (Osman *et al.*, 2020).

Based on the foregoing, the problem of failure of low virtual team's performance is considered an ongoing problem, and studies on the performance of virtual teams are insufficient to explain the problem of high failure rate. Previous studies that examined the performance of virtual teams had several gaps. Theoretical gap, contextual gap, population gap, and geographical gap, in the following study highlight each of them:

Regarding to theoretical gap, overall, there are nine research questions in the current study. There are five (5) questions that have been empirically answered before through previous studies, namely the first, second, third, fourth, fifth, and sixth (RQ1, RQ2, RQ3, RQ4, RQ5, RQ6). However, there are four research questions that have not been answered in prior literature, namely the sixth, seventh, eighth, and ninth

questions (RQ6, RQ7, RQ8, RQ9), thus, there is a theoretical gap in the prior studies that will be filled through the current study. (An empirical review of previous studies was carried out and the knowledge gaps at the theoretical level were stated in the previous section 2.10). In detail, there are theoretical gaps regarding ignoring previous studies in testing the effect of knowledge sharing as a mediator (Tan *et al.*, 2019; Bhat *et al.*, 2017; Davidaviciene *et al.*, 2020), and media richness as a moderator (Watanuki & De Oliveira Moraes, 2016; Wei *et al.*, 2018; Mysirlaki & Paraskeva, 2020; Presbitero, 2019) on the relationship between social presence practices, virtual leadership and virtual team performance, where the impact of this potential relationship was not examined.

Regarding to contextual gap, previous studies additionally suffer from a gap in investigating virtual teams in the higher education sector. The studies conducted on virtual teams in other sectors such as communications, health care, and agriculture cannot be relied upon due to the different characteristics of the virtual team according to the sector (Sagar *et al.*, 2022; Tan *et al.*, 2019; Soon & Salamzadeh, 2020). Hence, more studies required to be conducted in new additional sectors (Bhat *et al.*, 2017; Batarseh *et al.*, 2017; Davidaviciene *et al.*, 2020; Soon & Salamzadeh, 2020). Accordingly, it can be said that there is a need to study the nature of virtual teams in the higher education sector in response to this call.

Regarding to population gap, there is a population gap in prior literature, as most previous studies on virtual team performance in the higher education sector considered students as the study population instead of employees, such as the study of (Chen *et al.*, 2006; Schenkel & Garrison, 2009; Paul *et al.*, 2016; Fuller & Summers, 2017; Robert & You, 2018; Glikson & Erez, 2020; Randazzo-Davis & Nelson, 2020; Cheng *et al.*, 2021; Yoon & Leem, 2021; Zahari, 2021b), therefore, this problem was addressed in these literature from an educational point of view, not an administrative one.

Regarding to geographical gap, the majority of studies and statistics show a distinct lack of research on virtual team performance in Asia, particularly in Malaysia. There are obvious cultural differences between Asia, Europe, and America, and

different perceptions of virtual teams could affect the results, according to researchers, who stated that more studies on virtual teams in other countries are needed (Paul *et al.*, 2016; Tan *et al.*, 2019; Davidaviciene *et al.*, 2020; González-Anta *et al.*, 2021; Elyousfi *et al.*, 2021). Thus, in light of the new situation, there is a need to re-evaluate the factors that affect the virtual team's performance in the local context in Malaysia.

Based on the above, the main research problem lies in reevaluating the factors affecting the performance of virtual teams in the HEIs sector in Malaysia to support the establishment of effective virtual teams that contribute to the success and survival of institutions under unusual circumstances and uncertainty, where the studies ensure that there is a need to reassess the factors that influence the performance of virtual teams (Azlan *et al.*, 2020). The experience of virtual work in the higher education sector is in the early stage, and the factors affecting the performance of virtual teams in the higher education sector are still unknown, and its application in the higher education sector has faced great challenges.

From the foregoing, it is clear that there is a need to bridge the gaps found in previous studies. This study will attempt to contribute to solving this problem by developing a research model in the context of the higher education sector in Malaysia. This proposed model that includes the most key factors affecting the success of virtual teams in performing their tasks, and this model includes four main dimensions, namely; firstly, social presence with its four most important practices, which are trust, communication, building relationships, and cohesion. Secondly, virtual leadership is a key factor in leading educational organizations to success, survival, and competition in crisis conditions. Thirdly, share knowledge of its importance in the performance of virtual teams. Fourthly, the richness of the media for the means of communication technology used in the virtual team. The most important and relevant theories have been applied in the virtual work environment, namely Media Richness Theory (MRT), Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET) theories.

The consequences of the persistence of the problem may affect the competitiveness of HEIs in Malaysia at the regional and international levels in the

education market (Sia & Abbas, 2020; Zuofa & Ochieng, 2021). In addition, hybrid working strategies will become more common even after COVID-19 (Azlan *et al.*, 2020), and they must be taken into account by educational policymakers in Malaysia. In addition, failure to implement virtual teams effectively will waste the various opportunities provided by virtual teams for higher education in Malaysia even after the crisis to maintain them in the circle of global competition (Sia & Abbas, 2020). Moreover, HEIs in Malaysia need to provide evidence to stakeholders of their claims to provide quality education by proving their effectiveness, efficiency, and response to emergencies, especially during the pandemic crisis (Sia & Abbas, 2020). This innovative study approach will be very beneficial to the Malaysian government, which is interested in learning how effectively its freelance work plan is performed during a crisis. Additionally, it can be used to assist businesses and governments in determining whether to support legislation that permits individuals to remote work or to look into other options (Sulaiman & Effendi, 2022).

1.4 RESEARCH FRAMEWORK

The conceptual framework adopted in this study was derived from recent research, including the study by Tan *et al.* (2019). It is also based on the recommendations of other scholarly works such as Oliveira Moraes (2016); Bhat *et al.* (2017); Gordon (2017); Wei *et al.* (2018); Presbitero (2019); Han *et al.* (2020); Mysirlaki and Paraskeva (2020); and Davidaviciene *et al.* (2020). The conceptual framework of the study was also developed based on the knowledge gaps in previous studies.

This study's research model identifies five variables, drawing from earlier research and pertinent theories (such as Media Richness Theory (MRT), Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET) theories). This model includes two independent variables social presence (cohesion and trust, relationship building, communication), and virtual leadership, a dependent variable (virtual team performance), a moderator variable (media richness), and a mediator variable (knowledge sharing). The conceptual

framework of the study will be discussed in detail later in Section 2.12.1. Figure 1.1 represents the research framework of the current study:

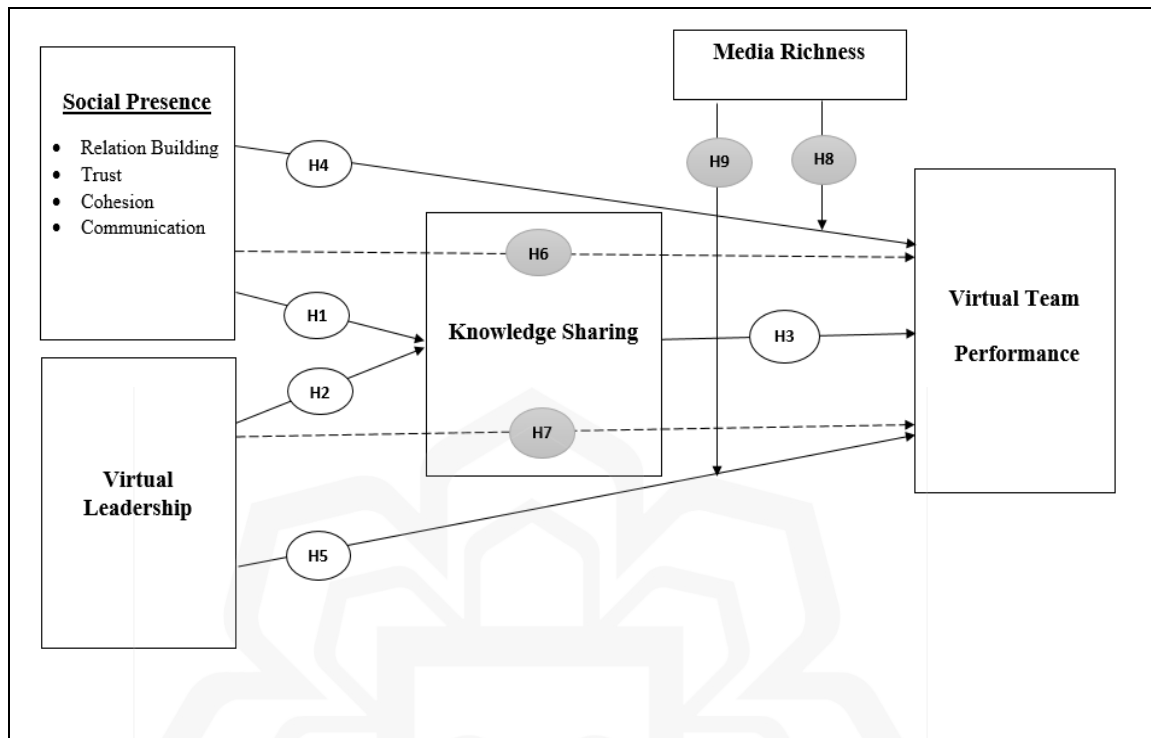


Figure 1.1 Research Framework

1.5 RESEARCH QUESTIONS

Based on the research problem, this study aims to answer the research questions listed.

1. **RQ1:** What is the influence of social presence practices (relationship building, cohesion, trust, and communication) on knowledge sharing among administrators at HEIs Malaysia?
2. **RQ2:** Is there a significant influence of virtual leadership on knowledge sharing among administrators at HEIs Malaysia?
3. **RQ3:** Is there a significant influence of knowledge sharing on virtual teams' performance among administrators at HEIs Malaysia?
4. **RQ4:** What is the influence of social presence practices (relationship building, cohesion, trust, and communication) on virtual teams' performance among administrators at HEIs Malaysia?

5. **RQ5:** Is there a significant influence of virtual leadership on virtual teams' performance among administrators at HEIs Malaysia?
6. **RQ6:** Does knowledge sharing mediate the relationship between social presence, and virtual team performance among administrators at HEIs Malaysia?
7. **RQ7:** Does knowledge sharing mediate the relationship between virtual leadership, and virtual team performance among administrators at HEIs Malaysia?
8. **RQ8:** Does media richness moderate the relationship between social presence practices (relationship building, cohesion, trust, and communication) and virtual teams' performance among administrators at HEIs Malaysia?
9. **RQ9:** Does media richness moderate the relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia?

1.6 RESEARCH OBJECTIVES

In this research, and based on the research questions and the research problem, the research objectives were developed to address the problem statement and answer the research questions, and thus the study objectives can be defined as follows:

1. **RO1:** To examine whether social presence practices (relationship building, cohesion, trust, and communication) have any influence on knowledge sharing among administrators at HEIs Malaysia.
2. **RO2:** To determine the influence of virtual leadership on knowledge sharing among administrators at HEIs Malaysia.
3. **RO3:** To determine the influence of knowledge sharing on virtual teams' performance among administrators at HEIs Malaysia.
4. **RO4:** To examine whether social presence practices (relationship building, cohesion, trust, and communication) have any influence on virtual teams' performance among administrators at HEIs Malaysia.

5. **RO5:** To test the influence of virtual leadership on virtual teams' performance among administrators at HEIs Malaysia.
6. **RO6:** To examine the mediating role of knowledge sharing on the relationship between social presence practices (relationship building, cohesion, trust, and communication) and virtual teams' performance among administrators at HEIs Malaysia.
7. **RO7:** To investigate the mediating role of knowledge sharing on the relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia.
8. **RO8:** To examine the moderating role of media richness on the relationship between social presence practices (relationship building, cohesion, trust, and communication) and virtual teams' performance among administrators at HEIs Malaysia.
9. **RO9:** To examine the moderating role of media richness on the relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia.

1.7 SIGNIFICANCE OF THE STUDY

Given the increasing use of virtual teams in the success of organizations in light of technological progress and the escalation of competition in the field of business, and given the lack of empirical studies in the context of higher education in Malaysia that examined the factors affecting the success of the virtual team's performance and which previous studies have proven to be a high rate of failure, the importance of the current study is highlighted to the relevant aspects such as researchers, practitioners, and decision-makers at the theoretical, practical and policy levels, respectively.

- **At the Theoretical Level**

This research contributes to the body of knowledge regarding VHRD, which is regarded as a novel aspect of VHR. In relevant prior research, there are variations in the theories explaining virtual team performance. Given these facts, the study offers a new perspective on combining the fundamental theories of virtual team performance

to solidify a thorough theoretical understanding of the virtual team performance environment. In particular, the application of SPT, MRT, SLT, and SET theories in the present study will increase our understanding of virtual team performance. Additionally, this work adds to our understanding of empirical research that improves virtual team performance.

- **At the Practical Level**

This study contributes to explaining the factors that enhance the performance of virtual teams, which contributes to the success of HEIs in Malaysia in achieving their goals by revealing the factors associated with the performance of virtual teams, such as the components of social presence consisting of building relationships, trust, cohesion, and communication. As well as by revealing the role of the virtual leader in facilitating the challenges facing virtual teams in accomplishing their tasks, and thus raising the performance of virtual teams. In addition, by highlights the importance of knowledge sharing in enhancing the performance of virtual teams. Finally, by explains the role of media richness in enhancing social presence and virtual leadership and thus improving the performance of the virtual team.

- **At The Policy Level**

This study helps educational policymakers, represented by the Ministry of Higher Education, to adopt an advanced strategy that takes into account the importance of employing virtual work in HEIs in Malaysia and hybrid work by integrating traditional and virtual work to benefit from the characteristics of each in a sustainable manner, especially during crises. This current study also provides new insights through which the goals of Malaysian education (MEBHE) (2015-2025) can be achieved, especially the eighth (Global Prominence) and ninth goals (Global Online Learning), which include providing distance education and attracting international

students. This may be achieved by employing the virtual work approach to managing work remotely.

1.8 SCOPE OF THE STUDY

The data to be tested in this study are primary data that have been collected through an appropriate questionnaire design. The data is sourced from virtual employees who worked in virtual teams during COVID-19 and beyond in the higher education sector in Malaysia. This survey shows their views on the level of performance of virtual teams and the impact of other factors on this performance. Based on the foregoing, the study boundaries criteria include employees of virtual teams who have the following qualities:

1. The scope of the study has been limited to employees who work in HEIs in Malaysia. According to MQA (2022), there are many different kinds of HEIs in Malaysia, including public universities, private universities, polytechnics, colleges, institutions, and university colleges. However, the Top-Ten Malaysian Universities according to the QS Index were identified as the population of the current study, due to their achievement of advanced results at the local, regional, and global levels.
2. This study is limited to employees who worked virtually (partially or completely) during or after COVID-19 using Information and Communication Technology (ICT).
3. This study is limited to administrative staff (non-academic) who worked virtually (partially or completely) during or after COVID-19 using (ICT).
4. This study is limited to employees who work in teams that have a common mission, vision, and goals. Overall, it includes all administrative departments, offices, divisions, and units that have a common vision, mission, and goals.

1.9 DEFINITION OF TERMS

1.9.1 Definition of Virtual Team

Virtual teams have been defined as “Groups of people who are dispersed in terms of space and time and use ICTs to accomplish their tasks.” (Velez-Calle *et al.*, 2020, p. 282).

1.9.2 Definition of Virtual Team Performance

Virtual team performance has been defined as “The ability of members to have results compliant with the targeted objectives by taking into account the impact of these results on the employees. Consequently, the efficiency of a virtual team is determined by the team performance and its members’ satisfaction” (Ben Sedrine *et al.*, 2020, p. 3).

1.9.3 Definition of Social Presence

Social presence has been defined as “The ability to identify with a community or a group, engage in meaningful discourse in a secure environment and eventually establish relationships through projecting one’s personality” (Maré & Mutezo, 2024, p. 3).

1.9.4 Definition of Relationship Building

Relationship building has been defined as “Includes interaction processed designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust” (Tan *et al.*, 2019, p. 2070).

1.9.5 Definition of Cohesion

Cohesion has been defined as “A dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuits of its instrumental

objectives and/or for the satisfaction of member affective needs” (Tan *et al.* 2019, p. 2071).

1.9.6 Definition of Trust

Trust has been defined as “The willingness of virtual projects team members to be reliant on each other based on the expectation that each member will perform actions beneficial to the success of the team” (Tan *et al.*, 2019, p.2071, 2072).

1.9.7 Definition of Communication

Communication has been defined as “The transition of information and understanding through the use of common symbols (verbal or nonverbal) between two or more team members in the appropriate manner” (Tan *et al.* 2019, p. 2070).

1.9.8 Definition of Virtual Leadership

Leadership is about the ability to influence. In the past, the ability to influence has been understood as F2F and physical leadership. When human civilization has accepted the internet and digital devices, then communication and leadership are also following the same trend. Likewise, leadership also has virtual or faceless leadership. Virtual leadership has been defined as "A process of social influence embedded in both proximal and distal AIT- mediated contexts that can change attitudes, emotions, thought, actions, and performance” (Soon & Salamzadeh, 2020b, p. 225).

1.9.9 Definition of Knowledge Sharing

Knowledge sharing has been defined as “The process of transferring and sharing knowledge among individuals or teams to reduce the time spent on solving a business problem” (Natu & Aparicio, 2022, p. 3).

1.9.10 Definition of Media Richness

Media richness has been defined as "The degree to which a medium can facilitate shared meaning" (Tseng *et al.*, 2019, p. 1358).

1.10 CHAPTER SUMMARY

One of the most prevalent practices in the context of Virtual Human Resources Development (VHRD), which has gained attention recently due to the development of communication media and the growing demand for it in light of global crises like the Coronavirus Disease 2019 (COVID-19) and others, is the performance of virtual teams. The performance of virtual teams is influenced by a variety of elements, including the social presence behaviors of team members, such as communication, cooperation, trust, and relationship-building. In addition to the vital function that virtual leadership plays in helping team members overcome obstacles. Additionally, the media richness employed in virtual work and knowledge sharing among virtual team members emerged as the aspects frequently examined in the context of virtual human resources.

In the first chapter, several topics were discussed such as a background review on the topic of research, then a brief discussion on the higher education sector in Malaysia, especially since the beginning of 2020 with the spread of COVID-19 and beyond in the world. After that, the study discusses the research problem resulting from the new work conditions. Based on the research problem, the research framework and the main research questions were determined and then the research objectives were stated accordingly. The importance of research on several theoretical, practical, and political levels was highlighted. In addition, the scope of the study was determined, as well as set criteria related to it. Finally, the operational definitions for each variable were presented in this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The second chapter presents previous studies related to the research topic. In particular, the second chapter includes a brief explanation of VHRD as a new dimension in human resources development, as improvement of virtual performance is one of its important practices in organizations, which in turn is the focus of the current study. The current chapter highlights the current study framework consisting of the most important factors associated with the performance of virtual teams, which are social presence practices such as building relationships, trust, cohesion, and communication. In addition to virtual leadership, knowledge sharing, and media richness. Then, the most important theories related to the research framework are presented, which are Media Richness Theory (MRT), Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET) theories. Moreover, the second chapter also addresses recent empirical studies between 2020 and 2024 that studied the relationships between the variables that make up the conceptual framework of the current study. After reviewing previous studies, the knowledge gaps in previous studies and the research contribution of the current study are highlighted. Finally, the conceptual framework of the current study and the study hypotheses will be reviewed.

2.2 VIRTUAL HUMAN RESOURCE DEVELOPMENT (VHRD)

As VHRD or Virtual HRD is considered a new dimension in human resource development, a few scholars have defined it. Virtual human resource development has been defined as "a media-rich and culturally relevant web[bed] environment that strategically improves expertise, performance, innovation, and community building through formal and informal learning" (Bennett & McWhorter, 2021, p.7). This definition highlights that virtual human resource development applications can lead to

improved expertise, performance, innovation, and community-building. Furthermore, VHRD uses an integrated technology environment to improve people's ability to learn and the effectiveness of their work processes, organisations, and individual groups of people (Phutrakhul, 2022). Another definition of VHRD has been stated as “A process of using the Internet or Web-based technologies to enhance individual, group, and organization effectiveness through training and development, organization development, and career development” (Garcia-villarreal, 2023, p.28).

Prior research indicated that in recent years, VHRD has started to garner more attention. For several decades, internet-based technology has been transforming work and education, according to theories in the field of VHRD research (Bennett & McWhorter, 2021; Phutrakhul & Sonsri, 2022). VHRD took place all around the world thanks to technology that was essential to both companies' continuity and education during COVID-19 and beyond. From being a peripheral field of study, VHRD is now at the core of organisational practice (Bennett & McWhorter, 2021; Phutrakhul & Sonsri, 2022). Since 2020, a lot of new companies and specialists have entered the VHRD field to comply with laws requiring work-from-home policies and alternative employment arrangements (Bennett & McWhorter, 2021).

As a result of technological advancements and the pandemic crisis, the public sector must adapt to VHRD, which is presently the most popular approach and will likely remain so in the future (Phutrakhul & Sonsri, 2022). The function of VHRD, which creates appropriate limits and harmonies with management, should come much earlier in the crisis and change process (Bennett & McWhorter, 2021). Regarding the Human Resources Development (HRD) paradigms, it should be mentioned that organisations have had to drastically change their working practices as a result of the COVID-19 pandemic and the rapid advancement of technology. This has led to the emergence of new kinds of work, such as working from home, holding teleconferences, or using new platforms. These elements are now the main forces behind the paradigm change from traditional HRD to what would be called "Virtual HRD" (VHRD) (Phutrakhul, 2022).

The study of Bennett and Bierema (2010) presents Virtual Human Resources (VHR) as consisting of two streams: virtual human resource management VHRM and VHRD. Figure 2.1 illustrates the practices and functions of VHRM and VHRD.

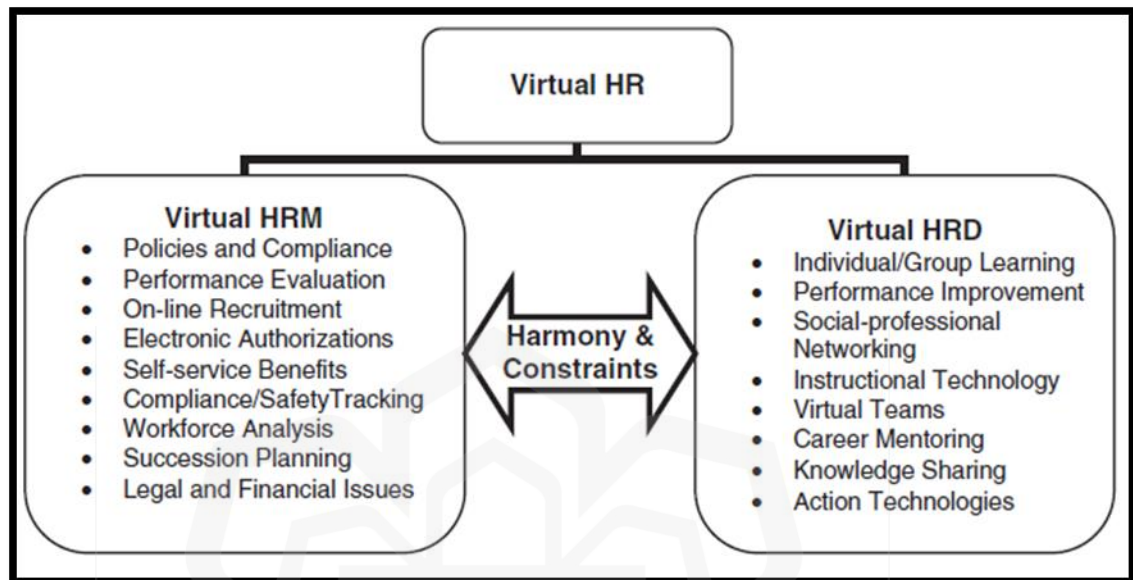


Figure 2.1 The Position of Virtual Teams in a Virtual HR Environment
 Source: (Bennett & Bierema, 2010)

Researchers consider VHRD as a subset of VHR, and they consider virtual teams and improvement of performance as the practices of VHRD (Bennett & Bierema, 2010). The study of Bennett and Bierema (2010) mentioned that virtual teams, performance improvement, social-professional networking, career mentoring by leaders, knowledge sharing, and action technologies are considered virtual human resource development practices. Therefore, this study adopts these practices as the main dimensions of the study model. In particular, the current study involves in its model four main components; virtual team performance, virtual leadership, knowledge sharing, richness of the media, and social presence with its most common components: building relationships, trust, communication, and cohesion.

Previous studies recommend further research on VHRD in the higher education sector. Higher education or research agencies should pay more attention to, and place more importance on, the study of HRD, especially the development of human resources in the public sector. There should particularly be support for research

studies on the improvement of VHRD. This would help in seeking or developing modern HRD models that are in accordance with the current situation (Phutrakhul & Sonsri, 2022).

2.3 VIRTUAL TEAM

2.3.1 Background of Virtual Team

Virtual work is becoming a fact reality, and it is expected to continue to grow. Virtual workspaces and virtual teams are being created for employees in response to the increasing international decentralization and globalization of public sector working methods (Elyousfi *et al.*, 2021a). Virtual teams are becoming a more popular way to organize as a result of the expansion of the global labor market (Newman *et al.*, 2020). In the 21st century, work environments are becoming more and more reliant on technology (Al Majzoub *et al.*, 2020). Employees use scientific and computer technologies to communicate and interact with partners and departments across the globe. Organizations create virtual teams, which are already commonplace, to facilitate quick decision-making and adaptable work arrangements across boundaries (Winter, 2020). Moreover, virtual teams are becoming more common in enterprises due to factors including globalization, advancements in information and communication technologies (ICTs), the rise in remote work and the establishment of computer-mediated groups, the knowledge economy, and digital culture (Abarca *et al.*, 2020; Wisesa *et al.*, 2021).

Virtual teams differ from traditional teams in physical interaction and degree of reliance on ICT (Velez-Calle *et al.*, 2020). Table 2.1 demonstrates how the work environment has changed from the traditional model to the virtual model, and how the activities associated with it have changed, such as the workplace, communication, driving, and others.

Table 2.1 Working Environment between Traditional and Virtual Paradigm

Practices	Old paradigm	New Paradigm
Workplace	1. Work as a physical place. 2. Work happens between 9 and 6. 3. Talent workforce available locally or nationally. 4. Work-life balance.	1. Does not matter from where you work. 2. Work happens when it is assigned 3. Talent workforce available across the globe. 4. Work-life integration.
Leadership	1. Employees to be monitored or micro-managed. 2. Facetime at office increases productivity. 3. Micromanagement of employees. 4. Power to control.	1. Employees are responsible for results. 2. Telecommuters are productive too. 3. Employees are high on accountability and ownership. 4. Empower and influence others.
Communication	1. Verbal, face-to-face communication. 2. Formal, authoritative, hierarchical communication. 3. Communicating feedback during annual appraisal. 4. Command and control.	1. E-communication using various platforms. 2. Open, interpersonal communication, collaboration across all levels. 3. Better conversations every day 4. Inclusive communication and engagement.

Source: (Mutha & Srivastava, 2021)

Crises such as wars, epidemics, and natural disasters accelerate reliance on virtual teams. For instance, COVID-19 crisis in 2020 prompted many institutions and companies around the world to adopt a new way of working, sometimes completely dependent on technology, and these institutions pushed their employees to work remotely (Ab Wahab *et al.*, 2023; Topaloglu & Anac, 2021). In this context, the growing need for virtual teams to maintain the presence of companies and provide their services through virtual space has emerged (Mysirlaki & Paraskeva, 2020). In the same direction, The study of Zhang *et al.* (2021) also indicates that with the outbreak of COVID-19, companies tended to work remotely more, and this led to a growth spurt in the use of virtual teams in the field of business and the academic field as well. Virtual teams are now a viable option for most firms to guarantee customer satisfaction and continued supply chain performance in light of the COVID-19 pandemic (Winter, 2020). Despite the post-pandemic shift, which saw many businesses adopt virtual teams and hybrid work settings, over 80% of businesses are now choosing remote employment (Ab Wahab *et al.*, 2023).

General trend of the number of publications about virtual teams on the Scopus database reveals that there is a continuous increase in the number of publications about virtual teams, as it reached its peak in 2007 and 2008 when the number of publications reached approximately 100. Moreover, it can be noted that the general trend decreased after 2007 and 2008 until the beginning of 2020, and then returned to increase, due to the spread of COVID-19, which forced organizations and companies to adopt virtual teams in doing business. Figure 2.2 indicates the number of publications about virtual teams on the Scopus database, distributed according to the years from 1994 to 2022.

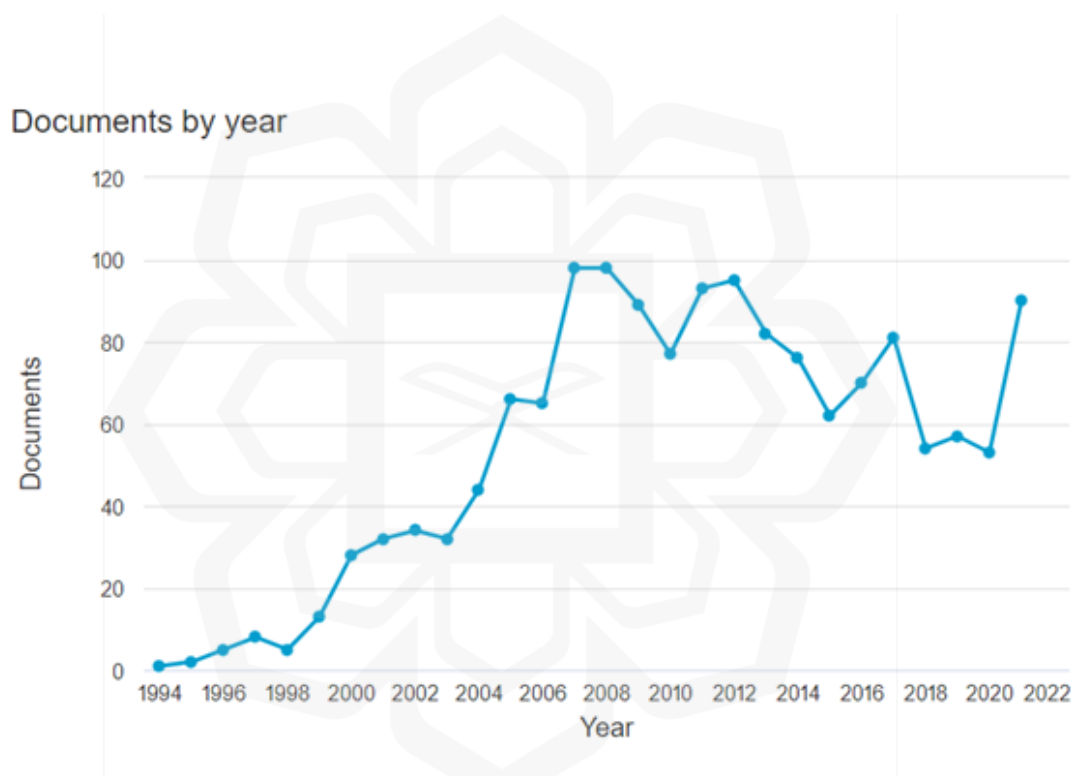


Figure 2.2 Distribution of Publications on the Virtual Teams by Years
Source: Scopus database on (19/1/2023)

In the higher education sector, virtual teams appeared in recent years, especially after COVID-19, when all HEIs switched to remote work. All institutions of higher education have stopped hosting seminars and conferences as well as other in-person educational events, these educational institutions have switched from offering services in person to doing them online. MHE announced on May 27, 2020, that all the work in public and private educational institutions must be conducted

remotely, (BERNAMA, 2020b), meaning that all administrative staff working in HEIs will perform their work remotely.

As demonstrated, the dependence on virtual teams is constantly increasing as a result of various factors such as technological advancement, attracting talent from all over the world, cost reduction, and other benefits of virtual teams that help organizations survive and compete. In addition, the recent COVID-19 accelerated the transition in the work environment from traditional methods to virtual ones. It is anticipated that more businesses will adopt virtual teams as a strategic option.

2.3.2 Concept of Virtual Team

To define virtual teams, several studies have expounded upon the notion. Virtual teams are described as “teams whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish interdependent tasks”. Moreover, virtual teams have been defined as “geographically and organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task” (Winter, 2020, p3). Several definitions of a virtual team have been provided in the relevant previous literature to attempt to define the determinants and characteristics of a virtual team. In Table 2.2, the study presents a set of researchers' definitions.

Table 2.2 Virtual Team Definition

Virtual Team Definition	Authors	Sources
"Teams Whose members use technology to varying degrees in working across locational, temporal, and relational boundaries to accomplish interdependent tasks".	(Martins, Gilson, & Maynard, 2004, p. 808)	(Soon & Salamzadeh, 2020); (Newman <i>et al.</i> , 2020)
"Groups of people who are dispersed in terms of space and time and use ICTs to accomplish their tasks".	(Bhagat <i>et al.</i> , 2011; Dulebohn and Hoch, 2017; Martins <i>et al.</i> , 2004)	(Velez-Calle <i>et al.</i> , 2020)
"Group of people that have a common goal or task to perform but are separated by distance or time".	(Edwards A and Wilson JR., 2004)	(Ioannidis & Makridis, 2020)
"A group of people or stakeholders working together from different locations and possibly different time zones, who are collaborating on a common project and use information and communication technologies (ICTs) intensively to co-create".	(Ebrahim <i>et al.</i> , 2009).	(Garro-Abarca <i>et al.</i> , 2021)
"As geographically and organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task".	(Hacker, Johnson, Saunders, and Thayer., 2019)	(Winter, 2020)

Source: Developed by the researcher based on the prior literature (Soon & Salamzadeh, 2020; Newman et al., 2020; Velez-Calle et al., 2020; Ioannidis & Makridis, 2020; Garro-Abarca et al., 2021; Winter, 2020).

Researchers have not agreed on a standard definition of virtual teams, however, there are common characteristics of virtual teams mentioned in previous definitions that can be drawn. From the previous definitions contained in Table 2.2, the most important characteristics of the virtual team can be deduced and arranged according to their importance in the definitions of researchers:

First, temporal and geographical dispersion. When discussing virtual teams, it is common to refer to the physical dispersion of team members across various geographic areas. Moreover, temporal dispersion is a notable feature, signifying that team members frequently operate on divergent schedules or are situated in different time zones. Second, harnessing ICTs. An overarching feature found in several definitions is the dependence on ICTs to facilitate efficient collaboration and exchange of information. Virtual teams primarily rely on communication tools such as email, instant messaging, video conferencing, and project management software to

organise and accomplish tasks, highlighting the crucial importance of technology in their functioning. Third, interdependence. Numerous definitions emphasise the interconnectedness of tasks among team members. Although they are physically apart, it is essential to have collaboration and coordination in order to successfully complete duties. This element highlights the cooperative characteristic of virtual teams. Fourth, shared objective. All descriptions highlight that virtual teams collaborate towards a common purpose. This underscores the significance of alignment and mutual goals among team members, who must collaborate efficiently despite geographical disparities. Finally, organisational environment. Numerous definitions acknowledge the organisational environment in which virtual teams function. Virtual teams are commonly established inside an organization's framework to accomplish certain goals, highlighting their strategic significance to the organisations.

In the present study, the virtual team can be defined as a group of people who are called to perform common goals, whether in the same geographical area, same country, or across borders. The main means of communication between team members are ICT such as social media platforms, communication applications, mail e-mail, and video conferencing. These teams come from distinct cultural backgrounds, different nationalities, different languages, and different time zones if these teams are global and operate across borders.

2.3.3 Types of Virtual Team

Previous literature indicates several types of virtual teams in terms of geographic distribution and ICT usage. In the following, the study reviews these differences according to previous studies:

2.3.3.1 Types of Virtual Teams According to Geographical Distribution

In terms of geographical distribution, there are local virtual teams that work within state borders, and there are GVTs that work across borders. Global VTs and National VTs have been defined as “Global VTs as being comprised of members who work and

live in different countries, and National VTs as being comprised of members geographically dispersed in the same nation with similar cultural settings” (Han *et al.*, 2020, p.2). Moreover, Soon and Salamzadeh (2020) indicated that virtual team members can be spread geographically within the country or across different countries. In addition, other researchers stated that “Virtual teams structures might include some F2F elements and geographic dispersion can range from global to local” (Guerra, 2017, p.7,8)

However, there is a third category for virtual teams according to their geographical distribution, which is the Virtual Partially Distributed Team (VPDT). Scholars have stated that VPDT is “a virtual team in which some of the team members collocate; the other team members are not collocated but are dispersed all over the world communication takes place via the use of ICTs and face-to-face” (Agbi, 2018, p.16). There are differences between the characteristics of Local and Global VTs. There are common characteristics of virtual teams and global teams, such as geographical distribution, the use of IT to communicate, and common goals. However, there are characteristics that distinguish GVTs from local teams, such as language barriers, time zone differences, and cultural differences. Table 2.3 represents the differences between the characteristics of local and global teams.

Table 2.3 Characteristics of Local and Global Virtual Teams

Characteristics	Local Virtual Teams	Global Virtual Teams
Geographical Distribution	√	√
Groups of Individual	√	√
Interdependent and Common Tasks	√	√
Information Communication Technology (ICT)	√	√
Different time Zones	-	√
Cultural Diversity	-	√
Organizational Boundaries	-	√
Different Nationalities	-	√

Source: Developed by the Researcher based on (Maznevski and Chudoba's, 2000; Soon & Salamzadeh, 2020; Avolio, Sosik, Kahai, & Baker, 2014; Morgan et al., 2014; Orhan, 2014).

Four categories—Virtual Teams vs. National Teams, Global Teams, Local Teams, and Virtually Distributed Teams—are highlighted in the chart that displays various virtual team types according to geographic distribution. The team members' geographic dispersion and degree of reliance on technology for communication characterize each category. While worldwide teams work across several nations and use communication technology to communicate, local teams work within closer geographical boundaries. If team members are distributed across borders or within a single country, they are classified as global or national teams. And last, a combination of people who are scattered and co-located make up virtual partially distributed teams. Table 2.4 shows the different definitions for local and global teams.

Table 2.4 Virtual Teams according to Geographical Distribution

Type of Virtual Teams	Definition	Authors	Sources
Local Virtual Team	“Virtual teams represent teams located across distance and time in which members primarily rely on technology for ongoing communication and collaboration and not merely for task completion; however, virtual team’s structures might include some f2f elements and geographic dispersion can range from global to local”.	(Avolio, Sosik, Kahai, & Baker, 2014; Morgan <i>et al.</i> , 2014; Orhan, 2014)	(Guerra-Brown, 2017)
Global Virtual Team	“Global virtual teams are teams whose members work from various geographical locations and manage their work and activities primarily via the use of information and communication technologies”.	(Hosseini <i>et al.</i> , 2015).	(Kwaye, 2018)
Global Virtual Team Vs. National Virtual Team	“ Global VTs as being comprised of members who work and live in different countries and of National VTs as being comprised of members geographically dispersed in the same nation with similar cultural settings”.	(Maznevski and Chudoba, 2000)	(Han <i>et al.</i> , 2020)
Virtual, Partially Distributed Team	“Virtual partially distributed team (VPDT) is a virtual team in which some of the team members collocate; the other team members are not collocated but are dispersed all over the world Communication takes place via the use of ICTs and face-to-face”.	(Eubanks, Palanski, Olabisi, Joinson, & Dove, 2016).	(Agbi, 2018)

Sources: (Guerra-Brown, 2017; Kwaye, 2018; Agbi, 2018; Han *et al.*, 2020)

2.3.3.2 Types of Virtual Teams according to Communication

Virtual teams can be divided according to communication into virtual teams that communicate exclusively via ICT, and there are teams that communicate partially via ICT. Researchers have argued that there are completely virtual teams that communicate exclusively through ICT for instance, an Exclusively Virtual Team have been defined as “a virtual team without any face-to-face communication, all communication takes place via the use of ICTs” (Agbi, 2018, p.16, 17)

On the contrary, there are partial virtual teams that work in the traditional way and meet F2F, in addition to using ICT in communication. The slightly virtual team has been mentioned as “slightly virtual team is similar to a traditional team with constant face-to-face communication, but also works and communicates via the use of ICTs Communication is mostly face to face” (Agbi, 2018, p.16). Table 2.5 illustrates the definition of researchers for each of the types of virtual teams in the business environment.

Table 2.5 Virtual Teams According to Communication

Type of Virtual Teams	Definition	Authors	Sources
Exclusively Virtual Team	“The exclusively virtual team is a virtual team without any face-to-face communication. All communication takes place via the use of ICTs”.	(Davidekova & Hvorecký, 2017; Morgan <i>et al.</i> , 2014).	(Agbi, 2018)
Slightly Virtual Teams	"The slightly virtual team is similar to a traditional team with constant face-to-face communication but also works and communicates via the use of ICTs Communication is mostly face to face".	(Wadsworth & Blanchard, 2015).	(Agbi, 2018)

Source: Developed by the researcher based on (Agbi, 2018) study

2.3.3.3 Type of Virtual Teams Adopts in the Current Study

The current study adopts the concept of National or Local virtual teams in Malaysia since these teams work in the higher education sector within Malaysia, and there are no members of these teams working from outside Malaysia. In addition, this study

adopts the concept of Slightly Virtual Teams, since these virtual teams working in the higher education sector in Malaysia communicate F2F as well as using ICT, which is the concept mentioned by (Agbi, 2018) in his study. Table 2.6 shows the type of virtual teams adopted in this study.

Table 2.6 Type of Virtual Team Adopted in this Study

Communication/Geographical Types	Global Virtual Team	Local Virtual Team
Exclusively Virtual Team	-	-
Slightly Virtual Teams	-	The current study

Source: Developed by the researcher based on prior studies (Guerra-Brown, 2017; Kwaye, 2018; Agbi, 2018; Han et al., 2020)

2.3.4 Benefits of Virtual Team

There are many benefits to employing virtual teams in organizations, and statistics indicate an increasing reliance on them due to the advantages of virtual teams. Virtual teams have many advantages, which have increased their use in organizations at an accelerating pace. Researchers have sought in many researches to present the benefits and advantages of virtual teams, and due to many and multiple benefits (Elyousfi *et al.*, 2021; Mysirlaki & Paraskeva, 2020; Velez-Calle *et al.*, 2020; Alkoud & Qatamin, 2023b), the employment of virtual teams in the business sector has increased and expanded to include all types of organizations, institutions, and companies, especially after the spread of COVID-19 in early 2020. Virtual teams have benefits for employees and employers. In the same direction, Mysirlaki and Paraskeva (2020) point out the opportunities of virtual teams where virtual teams provide important opportunities for both organizations and employees, as they provide opportunities for the organization to be more flexible in its structure and productivity as well as share knowledge across geographical regions, and also provide an opportunity for employees to work remotely and achieve a better work-life balance.

Researchers have tried to divide the benefits of virtual teams into several types. According to Alkoud and Qatamin (2023b) study, there are three main types of benefits of virtual teams, namely; the first of which is reducing costs. The second is to increase productivity. The third is the growth of target markets' geographic reach into international markets. The study highlights these benefits in detail as follows.

2.3.4.1 Cost Reduction

By implementing cross-border virtual labor, businesses and multinational enterprises can cut costs in a variety of ways. According to Sagar *et al.* (2022b), there is no denying that VPTs provide significant cost-saving advantages. Due to the growth of Multinational Virtual Teams (MNVT), GVTs can now forgo costly in-person meetings (Cheng *et al.*, 2021; Zaharie, 2021b). Moreover, Velez-Calle *et al.* (2020) have explained the various advantages of GVTs comparing F2F teams. Due to the significant advancements in ICT, virtual teams are now able to maximize the efficient use of resources by saving money, such as travel costs, time lost in travel, and transportation.

There are three main types of cost reduction, as shown by previous studies. First, reduction of overhead costs (Capolupo *et al.*, 2022; Schuster, 2022; Rogers *et al.*, 2021; Fekry *et al.*, 2023). Second, minimization of travel expenses (Velez-Calle *et al.*, 2020; Randazzo-Davis & Nelson, 2020; Morrison-Smith & Ruiz, 2020; Abarca *et al.*, 2020; Mysirlaki & Paraskeva, 2020; Majzoub *et al.*, 2020; Zuofa & Ochieng, 2021a; Eseryel *et al.*, 2021). Third, reduced employee turnover (Mysirlaki & Paraskeva, 2020; Majzoub *et al.*, 2020; Schuster, 2022; Rogers *et al.*, 2021; Elyousfi *et al.*, 2021b; Al Uwaisi & Devi, 2022).

2.3.4.2 Increased Productivity

Virtual teams are often more productive than traditional teams because they may communicate in real-time and have access to the newest technologies. This increased productivity may result in cost savings for firms as workers complete jobs faster and

with fewer errors. Many companies have set up virtual offices and profited from them, enhancing productivity (Sagar *et al.*, 2022b). Furthermore, Schuster (2022); Mysirlaki and Paraskeva (2020) claim that productivity increases when working remotely.

Virtual work increases productivity in three ways, in namely; first, access to a wider pool of talent (Velez-Calle *et al.*, 2020; Capolupo *et al.*, 2022; Randazzo-Davis & Nelson, 2020; Majzoub *et al.*, 2020; Morrison-Smith & Ruiz, 2020; Eseryel *et al.*, 2021; Zuofa & Ochieng, 2021a; Lin & Roan, 2022; Presbitero, 2020a). International companies can attract and benefit from a multi-skilled workforce from countries with low economies compared to countries with high economies such as the United States and Western Europe (Angelo & McCarthy, 2021). Second, 24-hour duty cycle (Randazzo-Davis & Nelson, 2020; Velez-Calle *et al.*, 2020; Majzoub *et al.*, 2020; Ben Sedrine *et al.*, 2020). Third, effective problem-solving (Presbitero, 2020a; Lin & Roan, 2022; Zuofa & Ochieng, 2021a; Majzoub *et al.*, 2020; Rogers *et al.*, 2021).

2.3.4.3 Global Market Expansion

International virtual teams play a crucial role in helping multinational corporations increase their market share on a worldwide scale. They achieve this through a variety of strategies, such as broadening the target market's geographic reach and swiftly adapting to the ever-changing business environment (Alkoud & Qatamin, 2023b). Virtual teams contribute to expanding global markets through the following, first, expanding the geographical scope of the target market (Sagar *et al.*, 2022b). Second, rapid response to the changing business environment (Lin & Roan, 2022; Majzoub *et al.*, 2020; Zuofa & Ochieng, 2021a; Eseryel *et al.*, 2021).

2.3.5 Challenges of Virtual Team

Organizations face major challenges in implementing virtual teams. One of the studies reviewed many articles and reached 255 articles on the challenges of virtual teams and concluded that there are five challenges that guide the success of virtual teams, namely geographical distance, time distance, perceived distance, formation of virtual

teams, diversity of virtual team members (Morrison-Smith & Ruiz, 2020). While the study of Alkoud *et al.* (2023) has divided the challenges of virtual teams into three main challenges, namely; Diversity Challenges, Technological Challenges, and Social Challenges, hence, the current study will discuss the challenges facing virtual teams in detail according to this study:

2.3.5.1 Social Challenges

Social behavior practices among virtual team members are among the factors that constitute the main challenges. There are challenges facing the employment of virtual teams in the business environment related to weak interdependence, and cohesion between team members, high independence, bad responses, lack of feelings, feelings of isolation, lack of audio-visual communication, lower trust, lower social interaction (Elyousfi *et al.*, 2021; Soon & Salamzadeh, 2020; Gibson & Grushina, 2021; Ioannidis & Makridis, 2020). Other researchers point out that there are five challenges facing virtual teams: lower physical contact, lower F2F synergy, lower trust, lower social interaction, and greater concern for reliability (Soon & Salamzadeh, 2020). However, challenges of virtual teams in term of social challenges can be divided into relationships building, trust, cohesion, and communication which are considered the main challenges facing virtual teams.

Prior research have highlighted that the key difficulty with virtual teams are first social challenge is relationship building (Aarthi & Sujatha, 2022; Alkoud *et al.*, 2023). The second social challenge is cohesion (Morrison-Smith & Ruiz, 2020; Zaharie, 2021b; Abd Shaheen & Alzubaidy, 2022; Sagar *et al.*, 2022a; Fekry *et al.*, 2023). The third social challenge is trust (Ben Sedrine *et al.*, 2020; Morrison-Smith & Ruiz, 2020; Zaharie, 2021b; Sagar *et al.*, 2022a; Fekry *et al.*, 2023; Abd Shaheen & Alzubaidy, 2022; Gallego *et al.*, 2021; Joshi *et al.*, 2022; Swart *et al.*, 2022). The fourth social challenge is communication (Morrison-Smith & Ruiz, 2020; Zaharie, 2021b; Sagar *et al.*, 2022a; Abd Shaheen & Alzubaidy, 2022; Joshi *et al.*, 2022; Syynimaa *et al.*, 2022).

2.3.5.2 Technical Challenges

Virtual teams face major challenges related to the means of communication between team members where technology is the only means of coordination in virtual teams. Poor communication between team members and feelings of isolation which can lead to weak team bonding. Moreover, the essential issue in communication through technology is that there is the inability to transfer non-verbal messages and tones, which leads to poor performance of the virtual team (Soon & Salamzadeh, 2020; Elyousfi *et al.*, 2021). Since the method of communication may not be immediate, this may lead to unsatisfactory results, for example leading to misunderstanding, loss of some information, difficulty in making decisions and sharing information. According to the study of Alkoud *et al.* (2023) and Swart *et al.* (2022), media richness can be divided into three categories:

- 1- First-generation technologies include conference calls, emails, and what's known as lean media. This type of media can be characterized as having limited human emotions and relying mostly on textual or spoken communication.
- 2- Second Generation Technologies such as video tools, online meeting tools, online discussion boards, and PowerPoint presentations can be called rich media, these technologies are proven to improve human engagement.
- 3- Third-generation technologies include Web 2.0 apps, cloud computing services, electronic data interchange, worldwide mobile communication systems, online file-sharing systems, and more. This is referred to as rich media. Web-enabled shared workplaces through the internet and cloud-based platforms are examples of third-generation technology. It is advised to use them for in-depth and complex information exchanges, particularly when knowledge-sharing is taking place.

2.3.5.3 Diversity Challenges

There are many challenges to the success of virtual teams that relate to the virtual team, especially, if the team members are global. The virtual team faces many difficulties if the virtual team is cross-border, such as issues of cultural diversity (Velez-Calle *et al.*, 2020; Elyousfi *et al.*, 2021; Abd Shaheen & Alzubaidy, 2022; Morrison-Smith & Ruiz, 2020). Issues of language diversity (Elyousfi *et al.*, 2021; Morrison-Smith & Ruiz, 2020; Zaharie, 2021b; Abd Shaheen & Alzubaidy, 2022; Swart *et al.*, 2022; Joshi *et al.*, 2022). Issues of time zone diversity (Velez-Calle *et al.*, 2020; Zaharie, 2021b; Morrison-Smith & Ruiz, 2020; Abd Shaheen & Alzubaidy, 2022). Issues of the geographical diversity of team members (Velez-Calle *et al.*, 2020; Morrison-Smith & Ruiz, 2020; Zaharie, 2021b; Swart *et al.*, 2022; Abd Shaheen & Alzubaidy, 2022).

The global challenges of the virtual teams will not be included in the proposed study model, since the current study will be applied to the higher education sector in Malaysia, where the employees are local, and therefore it is not expected that there will be challenges related to global challenges that affect the performance of these teams, such as time difference, language, cultures, nationalities. However, questions about diversity will be asked in instrument research to the expected participants in this study in the first section of the study questionnaire, which includes the previous characteristics of the virtual team to track any possible differences in the previous variables.

2.4 VIRTUAL TEAM PERFORMANCE

The performance of virtual teams is one of the issues commonly addressed in previous literature related to virtual teams. In the current study, the study will address the concept of virtual team performance, virtual team performance measures, and factors affecting virtual team performance.

2.4.1 Concept of Virtual Team Performance

Previous literature indicates the need to differentiate between virtual team performance and virtual team effectiveness. Mysirlaki and Paraskeva (2020) have pointed out that team effectiveness includes three dimensions: team performance, team member satisfaction, and team viability. Similarly, Ben Sedrine *et al.* (2020) revealed that member satisfaction and performance outcomes are included in the virtual team efficiency variable, and they take into account the variables that are most directly connected to the idea of the efficacy of the virtual team's performance.

Many previous studies sought to investigate the performance of the virtual team as a major factor in the context of VHRD. Virtual team performance has been defined as “the extent to which the group’s output meets the required standards or measures” (Chaudhary *et al.*, 2022, p.401). Moreover, team performance has been defined as “The ability of a team to accomplish its output, such as the quality, functionality, and reliability of results, thus the member’s expectations or its cost and time targets” (Ab Wahab *et al.*, 2023, p.35). Table 2.7 presents a set of definitions of the performance of virtual teams.

Table 2.7 Definition of Virtual Team Performance in Prior Literature

Virtual Team Performance Definition	Authors	Sources
“The level a team meets or exceeds the performance standards of those who review the output”.	(Hackman J., 1987; Zhu X. and Lee K., 2017)	(Ioannidis & Makridis, 2020)
“The extent to which the group’s output meets the required standards or measures”.	(Lurey and Raisinghani, 2001)	(Chaudhary <i>et al.</i> , 2022),
“A team's effectiveness can be measured when a team succeeds in producing superior output considering the team’s performance “well-performing”.	(Guzzo and Dickson, 1996)	(NurulJannah Ab Wahab <i>et al.</i> , 2023)
“It is the objective or subjective judgment of team that how effectively a team can meet its valued objectives”.	(Sheikh H. <i>et al.</i> , 2016)	(Ioannidis & Makridis, 2020)
“The extent to which a team achieves its goals or mission”.	(Baruch & Lin, 2012).	(Jafari, 2021)
“A work that focuses on determining the rate of progress in the project and the completion of the work”.	(Al-hamande & Ibrahim, 2023)	(Al-hamande & Ibrahim, 2023)

Source: Developed by the researcher based on prior studies (Ioannidis & Makridis, 2020; Jafari, 2021; Chaudhary *et al.*, 2022; Nurul Jannah Ab Wahab *et al.*, 2023; Al-hamande & Ibrahim, 2023)

Based on the previous definitions, the following characteristics can be extracted for the performance of virtual teams:

1. **Meeting or Exceeding Standards:** The performance of a virtual team is defined by its ability to meet or surpass the standards established by the people who evaluate the team's work. This implies an emphasis on meeting or exceeding certain standards for success.
2. **Output Fulfilling Standards:** Virtual teams' performance is assessed according to how well their output satisfies the necessary criteria. This highlights how crucial the caliber and applicability of the team's efforts are.
3. **Effectiveness in Producing Superior Output:** The ability of a virtual team to produce superior output is another factor used to describe the team's performance. This implies that high-quality results are anticipated from virtual teams, who are expected to perform well and surpass expectations.
4. **Evaluating a team's performance** involves considering both objective and subjective assessments of the team's ability to accomplish its desired goals. This recognizes that evaluations of performance can include both qualitative and quantifiable results.
5. **Attainment of Objectives:** The degree to which a virtual team fulfils its objectives or mission defines its performance. This emphasizes how crucial mission accomplishment and objective achievement are when assessing the effectiveness of virtual teams.
6. **Rate of Progress and Work Completion:** The project's progress and the work's completion are two additional criteria used to evaluate performance. This shows that in virtual team situations, the emphasis should be on efficiency and timely delivery of results.

2.4.2 Virtual Team Performance Measures

The issue of measuring the performance of virtual teams is one of the common issues addressed in previous studies. Virtual team performance is measured so that leaders and team members can compare and evaluate one other's efforts to reach objectives, find out how well money and other resources are spent, and create plans for performance enhancement (Topaloglu & Anac, 2021). Because most interactions, commitments, and outcomes are rapidly and electronically documented, virtual team performance is typically easier to track and assess (Mohammed *et al.*, 2022).

There are several different measures of performance in the previous literature. For instance, Ioannidis and Makridis (2020) relied on five measures of virtual team performance, these are team collaboration, quality of output, respect for deadlines, the effectiveness of work, and improvement in performance. Wickramasinghe and Nandula (2015) reviewed nine previous studies that measured the performance of the virtual team. Table 2.8 shows nine studies that measure virtual team performance.

Table 2.8 Measures of Virtual Team Performance in Prior Literature

Measures	Henderson and lee (1992)	Faraj and Sproull (2000)	Hinds and bailey (2003)	Hinds and Mortensen (2005)	Hertel <i>et al.</i> (2005)	Huckman <i>et al.</i> (2007)	Staples and webster (2007)	Bourgault <i>et al.</i> (2008)	Saxena and burmann (2014)
Ability to cope (by team members)							√		
Ability to meet project goals		√							
Adherence to time schedules	√	√		√		√			√
Adherence to budgets	√	√		√		√			√
Adherence to end-user specifications									√
Delivered source code instructions per person-hour	√								
Extent of meeting design objectives	√								
Formalization of decision processes								√	
Initiative of the team					√				
Intention to remain on the team							√		
Number of defects in acceptance testing						√			
Perceived individual performance							√		
Positive work experiences for team members/satisfaction with the team							√		
Quality of decision-making process					√			√	
Reputation of work excellence/work Reputation of work excellence		√		√					

Measures	Henderson and lee (1992)	Faraj and Sproull (200)	Hinds and bailey (2003)	Hinds and Mortensen (2005)	Hertel et al. (2005)	Huckman et al. (2007)	Staples and webster (2007)	Bourgault et al. (2008)	Saxena and burmann (2014)
Team autonomy								√	
Team operations/team effectiveness in performing tasks/perceived team performance		√	√				√	√	
Team efficiency in performing tasks			√	√	√				
Technical innovation				√					
Work quality/quality of the teamwork results		√		√	√				

Source: (Wickramasinghe & Nandula, 2015)

Based on their thematic focus, the offered virtual team performance measures can be divided into multiple categories:

1. Project Management

This category comprises metrics for efficiently allocating resources, scheduling projects, and maintaining project quality. It includes things like fulfilling end-user requirements, staying within budget and schedule, completing projects on time, guaranteeing job quality, and creating a supportive team environment.

2. Formal Processes and Decision-Making

The formalization and caliber of the team's decision-making procedures are the main topics of these metrics. This covers the procedure by which decisions are made, their general quality, and the degree of formality involved in those processes.

3. Team Dynamics and Cohesion

This category includes member satisfaction, cohesion, and team dynamics metrics. It comprises elements that add to the team's overall efficacy and cohesiveness, such as team initiative, intention to stay on the team, reputation for work quality, and team autonomy. These categories offer an organized framework for assessing several facets of the performance of virtual teams, encompassing issues of project management as well as team dynamics.

2.4.3 Factors Affecting Virtual Team Performance

There are various prior studies that have addressed the factors affecting the performance of virtual teams, and they are of two main types: The first type is review research, such as systematic literature, meta-analysis, and bibliometric analysis. The second type is empirical research, and the study below reviews these research in detail:

2.4.3.1 Review Researches

Previous studies on the performance of virtual teams indicate that they are still in their early stages. According to Ferreira *et al.* (2021), the results show that virtual and augmented reality in human resources management and development is still in a very early stage, requiring more in-depth research. The results so far are promising, namely in terms of the impact that this technology can produce in some human resources management and development processes (Ferreira *et al.*, 2021). Along the same line, the study of Abarca *et al.* (2020) indicted that the primary finding was that, there haven't been as many papers on virtual teams in recent years, however, it has become more crucial to research this field in light of the coronavirus pandemic, or COVID-19. In the upcoming years, this technology will undoubtedly be promoted by reductions in transportation costs and fear of future pandemics. In specific, research is mostly needed in the areas of emotions, communications, technology, and trust (Abarca *et al.*, 2020).

In detail, several researchers have conducted studies on the factors affecting the performance of virtual teams through review research, such as systematic literature, meta-analysis, and bibliometric analysis. For instance, the study of Chaudhary *et al.* (2022) indicated that the meta-analysis demonstrates that cohesion has a major impact on virtual team performance. Furthermore, the study's findings point to a positive correlation between team cohesion and virtual team performance (Chaudhary *et al.*, 2022). Another bibliometric study was conducted by Šímová and Zychová (2023) and it concluded that there are two historical study areas: the first

cluster dealt with the multicultural dimension and the second cluster, dealt with trust and communication, knowledge sharing, virtualness, and leadership.

2.4.3.2 Empirical Researches

There are a number of previous empirical studies that have been conducted that have examined the factors that influence the performance of virtual teams. The current study collected previous empirical studies and presented them in a table that includes authors, year of publication, independent variables, dependent variables, mediating variables, and moderator variables. Table 2.9 demonstrates empirical studies that examined the factors affecting the performance of virtual teams from 2015 to 2021.

Table 2.9 Factors Affecting the Performance of Virtual Team 2015-2021

Sources	Independent Variables	Mediator Variables	Moderator Variables	Dependent Variables
(Wickramasinghe & Nandula, 2015)	Diversity in team composition	Relationship conflict	Team leader support	Virtual Team Performance
(Ebrahim, 2015)	Knowledge Worker- Process Technology	-	-	Virtual Team Effectiveness
(Paul <i>et al.</i> , 2016)	Coordination Effectiveness	Trust, Team Cohesion	-	Virtual Team Performance
(Marlow <i>et al.</i> , 2017)	Team diversity	Communication Frequency, Communication Quality, Communication Content Trust, Cognition	-	Team Effectiveness Team Performance, Team Satisfaction, Viability
(Hoch & Dulebohn, 2017)	Team Personality Composition	Emergent And Shared Leadership	Team Virtuality	Virtual Team Performance
(Lippert & Dulewicz, 2018)	Trustworthiness-Commitment Communication Characteristics Cross-Cultural Communication Style- Structure Effects	-	-	Virtual Team Performance
(Wei <i>et al.</i> , 2018)	Team Cohesion Team Confidence Communicating virtually KSA Collaborating virtually KSA	Trust Creativity Perceived Team Performance	-	Perceived Team Performance
(Jahanbin & Wingreen, 2018)	Social Media Tools	Social Media Affects Specialization Social Media Affects	-	Virtual Team Performance

Sources	Independent Variables	Mediator Variables	Moderator Variables	Dependent Variables
		Credibility Social Media Affects Coordination		
(Robert & You, 2018)	Shared Leadership	Satisfaction in Virtual Teams Individual Trust Individual Autonomy	-	Virtual Team Performance
(Presbitero & Toledano, 2018)	Cross –Cultural Training	-	Contact Intensity	Individual- level task Performance
(Tan <i>et al.</i> , 2019)	Coordination, Communication, Relationship Building, Cohesion, Trust, and Reward.	-	-	Virtual Team Performance
(Lin <i>et al.</i> , 2019)	Transactional fulfilment IT Training fulfilment Knowledge- oriented leadership	Collective IT efficacy	-	Virtual Team Performance
(Presbitero, 2020c)	Team member's perceived cultural dissimilarity	-	Team member's cultural Intelligence, Team leader's cultural intelligence	Team member's task performance
(Davidaviciene, Majzoub, <i>et al.</i> , 2020a)	Trust- ICT- information sharing- language	decision- making processes	-	Virtual Team Performance
(Mysirlaki & Paraskeva, 2020)	Leader Emotional Intelligence	Transformation al Leadership	-	TeamPerformance, Team Viability, Team Member Satisfaction
(Ben Sedrine <i>et al.</i> , 2020)	Leadership styles	Trust Operational cohesion	Media Richness	Virtual team efficiency (Performance,S atisfaction)
(Soon & Salamzadeh, 2020)	e-communication, e-social e-change, e-tech savvy e-team, e-trustworthiness	-	-	virtual team effectiveness
(Newman <i>et al.</i> , 2020)	Perception of Virtual Team Members	-	Team Members' Trust	Virtual Team Performance
(Presbitero, 2020b)	Foreign language skill	Foreign language anxiety	Cultural intelligence (Cultural knowledge, cultural metacognition , cultural skill)	Task performance
(Han <i>et al.</i> , 2020)	Team Training- Global Dispersion	-	Leadership Role Effectiveness	Virtual Team Performance
(Newman <i>et al.</i> , 2020)	Team Member Perception	-	Team members'	Virtual Team Performance

Sources	Independent Variables	Mediator Variables	Moderator Variables	Dependent Variables
			trust in their leaders	
(Randazzo-Davis & Nelson, 2020)	Global Knowledge	Cultural Intelligence	-	Virtual Team Performance
(Garro-Abarca <i>et al.</i> , 2021)	Tasks-Leadership-Cohesion Empowerment	Communication Trust	-	Virtual Team Performance
(Zaharie, 2021b)	VTs challenges Trust	Preference for TVs	Openness to Experience	Virtual Team Performance
(Elyousfi <i>et al.</i> , 2021a)	Team Collaboration Team Support Team Team Behaviours Perceived E-Leadership Leader Trust Leader Communication Coordination Leader Behaviour	Perceived Team Dynamics	-	Virtual Team Performance

Source: Developed by the researcher based on 25 empirical prior studies

By analyzing Table 2.9, the study calculated the frequency of factors, that affect virtual team performance tested in previous studies from 2015 to 2021 to extract the most common factors that researchers included in their studies. Moreover, the study collected similar factors in themes to give a brief picture of the most common factors affecting the performance of the virtual teams, in addition to calculating the frequencies and the relative weight of each theme to show the relative importance of each factor. Table 2.10 shows the process of analyzing the factors affecting the performance of virtual teams through the analysis of empirical studies from 2015 to 2021.

Table 2.10 Categories of Factors Affecting Virtual Team Performance 2015-2021

Codes	Frequency	Themes	Frequency	Relative Weight
Collaboration	2	Social Activities	37	40.21%
Relationship Building	1			
E-Social	1			
Cohesion	5			
Coordination	4			
Trust	14			
Team Confidence	1			
Communication	7			
Contact Intensity	1			
E-tech savvy	1			

Codes	Frequency	Themes	Frequency	Relative Weight
Emergent and Shared Leadership	1	Leadership	11	11.95%
Shared Leadership	1			
Leadership	1			
Leader support	1			
Oriented leadership	1			
Leader Emotional Intelligence	1			
Transformational Leadership	1			
Leadership styles	1			
Leadership Role Effectiveness	1			
Leader Behaviour	1			
Team Support	1			
Team Virtuality	1	Team issues	10	10.86%
Team Personality	1			
Team Structure	1			
VTs challenges	1			
Preference for TVs	1			
Team Behaviours	1			
Team Dynamics	1			
Team conflict	1			
Team Member Perception	2			
Diversity	3	Team Diversity	6	6.52%
Language	2			
Global Dispersion	1			
ICT	1	Media Richness	4	4.34%
Collective IT efficacy	1			
Media Richness	1			
Social media Tolls	1			
Knowledge	1	Knowledge Sharing	4	4.34%
Global Knowledge	1			
Information sharing	1			
Cognition	1			
Cultural Intelligence	3	Culture	3	3.26%
IT Training fulfilment	1	Training	3	3.26%
Team Training	1			
Cross –Cultural Training	1			
Commitment	1	Other Factors	14	15.21%
Credibility	1			
Specialization	1			
Satisfaction	1			
Autonomy	1			
Reward	1			
Transactional fulfilment	1			
Decision-making processes	1			
Operational	1			
E-change	1			
E-team	1			
Tasks	1			
Empowerment	1			
Openness to Experience	1			
92 Factors	92 Codes	9 Themes	92	100%

Source: Developed by the researcher based on analysing 25 empirical prior studies

According to previous empirical studies, the factors affecting virtual teams can be classified into 8 main factors:

1. Social Activities:

This subject highlights the value of social contacts and team-building exercises in virtual teams. It consists of code Collaboration. It illustrates how important it is to provide team members with opportunities for social interactions, team-building activities, and casual get-togethers. In the end, these exercises improve team performance by encouraging cooperation, trust, and cohesiveness among team members.

2. Leadership:

The theme of leadership, which includes codes such as transformational leadership and emergent and shared leadership, emphasizes the vital role that leadership plays in directing and motivating virtual teams. Building team members' trust, offering assistance, and encouraging cooperation are all components of effective leadership. Emotionally intelligent, flexible, and visionary leaders can successfully traverse obstacles and foster team success.

3. Team Issues:

These codes, which include team virtuality and team member perception, highlight the different dynamics and difficulties that arise in virtual teams. This theme includes things like communication hurdles, dispute-resolution techniques, and team organization. Fostering open communication, developing trust, and encouraging a healthy workplace culture that embraces inclusivity and diversity are all necessary to address these difficulties.

4. Team Diversity:

This topic emphasizes the value of accepting a range of viewpoints, experiences, and backgrounds in virtual teams. It consists of codes such as diversity.

Diversity fosters creativity, improves problem-solving skills, and enriches team interactions. Fostering an inclusive workplace where all members feel respected and empowered to contribute is essential to maximizing the talents of a diverse team.

5. Media Richness of ICT:

The ICT theme, which includes codes like ICT, highlights how technology helps virtual teams communicate, collaborate, and share knowledge. Coordinating tasks, managing projects, and exchanging information are all made easier by utilizing digital tools and platforms. Using ICT resources effectively improves team productivity, efficiency, and connectedness even when teams are spread out geographically.

6. Knowledge Sharing:

Knowledge Sharing emphasizes the value of exchanging knowledge, information, and best practices among remote teams. It is symbolized by codes such as Knowledge. The importance of creativity, teamwork, and ongoing learning is emphasized by this theme. Promoting a culture of knowledge sharing increases team effectiveness, builds mutual trust, and propels company success.

7. Culture:

The theme of culture, which includes codes such as cultural intelligence, highlights the significance of cultural sensitivity and awareness in virtual teams. Respecting and being aware of cultural differences facilitates productive teamwork, relationship-building, and communication. Team members who have developed their cultural intelligence are better equipped to negotiate differing viewpoints and collaborate peacefully to achieve shared objectives.

8. Training:

The Training topic emphasizes the value of giving virtual team members continual learning and development opportunities. It includes codes like IT training

fulfillment and cross-cultural training. Programs for training improve competences, knowledge, and abilities related to leadership, communication, and virtual teamwork. Putting money into training programs guarantees that team members have the skills necessary to thrive in the dynamic virtual workplace.

9. Other Factors:

This category includes codes such as commitment and reward and includes a range of other factors that affect the performance of virtual teams. These elements consist of autonomy, task specialization, reward structures, and team commitment. Fostering a culture of support among the team, encouraging accountability, and coordinating organizational objectives with personal and group goals are all necessary to address these concerns.

Figure 2.3 shows that there are 9 factors affecting virtual teams that were included by researchers in their research models that measure the factors affecting virtual teams.

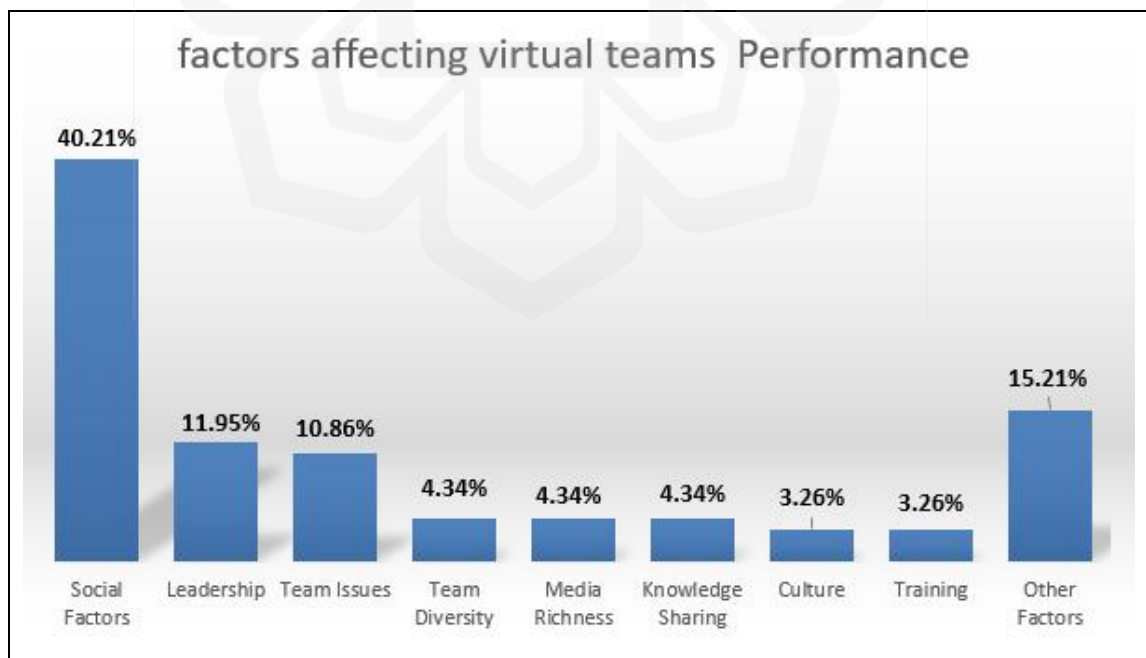


Figure 2.3 Factors Affecting Virtual Teams Performance 2015-2021

Source: Developed by the researcher based on analysing 25 empirical prior studies in Table 2-9 and Table 2.10

Through a review of previous empirical literature, social factors have the most influence on the performance of virtual teams by 40.21% compared to other factors. Next comes the role of leadership at 11.95%, then important issues for the virtual team at 10.86%, then team diversity at 4.34%, media richness at 4.34%, knowledge sharing at 4.34%, then the cultural factor at 3.26%, then training at 3.26%, and finally there were various factors. 15.21%.

2.5 SOCIAL PRESENCE

Social presence is one of the factors that has been studied recently in the virtual team environment. The concept of social presence has only recently gained traction in the literature on virtual teams. The current study sheds light on social presence in virtual teams by referring to the concept of social presence, the dimensions of social presence, and the role of social presence in enhancing the performance of virtual teams.

Several definitions of social presence have been discussed in the previous literature. For example, one technological solution to the problem of not being able to meet someone in person is the creation of what is called social presence (Ben Sedrine *et al.*, 2020). Additionally, social presence is defined as “The ability to identify with a community or a group, engage in meaningful discourse in a secure environment, and eventually establish relationships through projecting one’s personality” (Maré & Mutezo, 2024, p.3). Moreover, social presence is characterized as “ The degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships.”(Almahdi *et al.*, 2023, p.3). Furthermore, social presence has been defined as "The degree of awareness of other people in an interaction and the subsequent recognition of interpersonal relationships" (Ben Sedrine *et al.*, 2020, p.3).

Defining social presence in the context of virtual teams carries other characteristics. For instance, Loode (2021, p.9) defined presence as “the extent to which a communication tool enables the group members to observe (feel) the actual presence of the team members and the resulting valuation of inter-personal

relationships, even though they are situated in distinct locations, operate at different moments in time, and all communication takes place via electronic means”.

Moreover, social presence has been defined as "One can experience a virtual environment by actually being inside a mediated environment" (Catyanadika & Rajasekera, 2022, p.34). Overall, social presence is defined as “The extent to which we view other individuals in a technology mediated interaction as real people, and as a result of the extent to which we view our interactions with them as authentic social interactions, and as a result, the extent to which we view our interactions with them as authentic social interactions” (Dahlstrom-Hakki *et al.*, 2020, p.6).

Previous studies have shown that social presence enhances the performance of the virtual team. Members of a team that have a low social presence may perform worse because they ignore or postpone important remarks or information. Reduced social signals from poor social presence are likely to result in less interaction and reciprocity, which are necessary for high-quality communication (Loode, 2021; Alkoud *et al.*, 2023). Building relationships, trust, cohesion, and communication are a few of the key social elements that influence virtual team satisfaction and team performance (Ben Sedrine *et al.*, 2020; Singh *et al.*, 2021; Alkoud *et al.*, 2023). Studies show that social presence in virtual teams has common dimensions including (relationship building, cohesion, trust, and communication). In detail, the success of virtual teams depends on social factors including relationship building, coherence, and trust (Lin *et al.*, 2008; Alkoud *et al.*, 2023). Moreover, communication is the lifeblood of the virtual team members and increases their social presence. Consequently, increasing social presence is one of the main objectives of networked communication systems (Oh *et al.*, 2018).

It should be noted that social presence in traditional teams differs from virtual teams. Where the social presence in the virtual teams depends on the virtual incubator for communication between the team members to increase their sense of trust, and cohesion and build relationships. In the following paragraphs, the study highlights the dimensions of social presence in virtual teams, including building relationships, trust, cohesion, and communication:

2.5.1 Relationship Building

Relationship building is one of the elements of social presence in the virtual team's environment. The current study shed light on several issues related to building relationships between members of the virtual team, such as the concept of building relationships, the reasons for the weakness of building relationships between members of the virtual team, and the role of building relationships in the performance of virtual teams.

There are several definitions received about building relationships between virtual team members. Tan *et al* (2019, p.2027) argued that relationship building is defined "as includes interaction process designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust". From the definition made by Tan *et al.* (2019), the relationship is conditioned by interaction, process, internalizing into feeling, and being included as the basis for any relationship building. The interaction is beyond just mere communication. It has a process in communication. Likewise, feeling and being included are also interrelated with communication. Moreover, relationship building is defined as "includes interaction processed designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust" (Tan *et al.*, 2019, p.2027).

Several reasons prevent building strong relationships between virtual team members. Compared with F2F teams, members of virtual teams are not able to form strong relationships (Sagar *et al.*, 2022). Relationships between team members can be allowed to naturally develop in a F2F team environment. However, in the virtual team, lack of F2F connection, the (often) nonsynchronous nature of team members' communications, and geographical dispersion can all have a negative impact on the effectiveness of the team (Zhang *et al.*, 2022). However, in the existing literature, little empirical attention has been paid to how to create and maintain relationships within virtual teams (Zhang *et al.*, 2022).

Building relationships within the virtual team has a fundamental role in the performance and success of the virtual team. Building trustworthy relationships is essential to the success of virtual teams because individuals who trust one another are

more inclined to take risks that benefit the team as a whole (Sagar *et al.*, 2022). Team performance is proven to be positively impacted by relationships among team members and a favorable environment (Zaharie, 2021b). Moreover, it has been demonstrating that trust, motivation, relationship-building, and communication are all positively correlated with team performance and reward (Aarthi & Sujatha, 2022).

2.5.2 Cohesion

Cohesion is a vital component of the virtual team's social presence. This study reviews several issues related to the cohesion of virtual teams, including the concept of cohesion between members of the virtual team, the reasons for the weakness of the virtual team, and finally the relationship of cohesion with virtual team performance.

Previous studies showed different definitions of cohesion among virtual team members. Cohesion has been defined by many researchers. Team cohesion is stated as the commitment of each team member to stay united in the pursuit of the team's objectives and to each member's emotional demands. Cohesion is stated as "team members' attraction and commitment to their team, team members, and the team's task" (Bartsch *et al.*, 2020, p.4). Moreover, cohesion has been defined as "The set of forces which oblige the members to remain together within a group" (Ben Sedrine *et al.*, 2021, p.5). Furthermore, cohesion is defined as "The attraction and closeness of team members working toward common goals built on the development of trust". Additionally, cohesion is defined as "the degree to which team members work together to achieve organizational objectives" (Fahlevi *et al.*, 2022, p.178).

There are various reasons for the weakening of cohesion between members of the virtual team. Studies on traditional teams have shown that members' physical distance from one another can become a psychological distance, by extension, the geographic dispersion of the virtual team may compromise cohesion (Chaudhary *et al.*, 2022). Virtual team members typically report poorer team cohesion as compared to traditional team members. This is mostly a result of how heavily the team members rely on technologies and communication tools (Sagar *et al.*, 2022). Previous research compared virtual teams to traditional teams to evaluate the impact of cohesion on

performance, but the results were different. As a result, traditional teams had higher levels of team cohesion than virtual teams because collaborative tactics postponed the formation of cohesion in virtual teams. Other research has discovered that although virtual teams initially have weaker cohesion, they eventually communicate enough social information to form cohesive teams (Chaudhary *et al.*, 2022).

Cohesion among team members plays a role in the performance of the virtual team. According to Chaudhary *et al.* (2022), cohesion is positively related to coordination which increases performance. Moreover, cohesiveness is considered a key element impacting teams' effectiveness (Sagar *et al.*, 2022). A large body of empirical research demonstrates that team cohesion is essential for team performance, particularly in circumstances involving sustained collaboration on challenging subjects, moreover, team performance has a high correlation with team cohesion, which comprises elements of social and task cohesion (Torro *et al.*, 2022). Since there is an empirical connection between group cohesion and effectiveness, VT leaders must foster a positive social environment to guarantee team cohesion (Elyousfi *et al.*, 2021b).

2.5.3 Trust

Trust is one of the most common factors examined in the literature review on virtual teams. Here the study discusses some issues related to trust among members of the virtual team, including the concept of building trust, the challenge of building trust, the reasons for the lack of trust, the consequences of the lack of trust, and the relationship of trust with the performance of the virtual team.

There are many definitions of trust mentioned in previous studies. For instance, trust has been defined as “level of confidence that one individual has in another’s competence and his or her willingness to act in a fair, ethical, and predictable manner” (Elyousfi *et al.*, 2021, p.4). Moreover, trust is defined as “a psychological state that manifests itself in the behaviours towards others, is based on the expectations made upon behaviours of these others, and on the perceived motives and intentions in situations entailing risk for the relationship with those others” (Gohar

et al., 2023, p.139). Furthermore, according to Fahlevi *et al.* (2022, p.179), trust is defined as “The vulnerability of a group or an individual to act according to the leaders' expectations to increase organizational performance”.

Trust among virtual team members is one of the main challenges to the success of virtual teams. According to Sagar *et al.* (2022), despite the many benefits of virtual teams, the low level of trust among members of the virtual team is one of the most important difficulties that raise the level of probability of failure of the virtual team. The lack of team member trust is a significant problem with virtual teams (Sagar *et al.*, 2022). Spacing between team members requires other ways of communicating different from the traditional methods, and then building trust between team members is a challenge. Furthermore, compared to a traditional team environment, coordination between teams, trust-building, development of shared mental models, and conflict management call for extra effort in virtual teams (Ben Sedrine *et al.*, 2020). Building trust in virtual teams is particularly difficult because it is impossible to assess a teammate's reliability before seeing them (Sagar *et al.*, 2021).

Many reasons lead to a lack of trust between members of the virtual team. Numerous studies have addressed the issue of trust in virtual teams, and several factors that affect trust in both traditional and virtual teams have been emphasized. These factors are connected to time, cultural similarity, and physical geographic proximity (Ben Sedrine *et al.*, 2020). Moreover, Ben Sedrine *et al.* (2020) further indicated that distance communication frequently inhibits the sharing, development of trust, and sense of shared responsibility that define group work. As a result of the lack of social information sharing caused by asynchronous communication, trust grows more slowly in virtual teams than it does in physical ones (Sagar *et al.*, 2021).

Trust among virtual team members is an influential factor in the performance of the virtual team. Many authors have stressed the significance of trust as a vital element of VPT success. Building trustworthy relationships is essential to the success of virtual teams because individuals who trust one another are more inclined to take risks that benefit the team as a whole. Moreover, one should think about the function provided by the shared trust amongst virtual colleagues to enable building virtual team

to perform at their best (Sagar *et al.*, 2022). A recent study found that virtual distance could reduce team members' trust by 83%, however, there is currently a lack of comprehensive knowledge of how trust and variables impacting VPT effectiveness relate to one another (Sagar *et al.*, 2021). There are many consequences to the lack of trust between members of the virtual team. The lack of trust between team members may make it difficult to form a sense of shared identity, and thus prevent performance in the virtual team (Ben Sedrine *et al.*, 2020).

2.5.4 Communication

Communication in the virtual team environment is commonly referred to in the previous literature. The following paragraphs present several issues related to communication within virtual teams, such as the concept of communication, the consequences of the absence of effective communication, and the role of communication in the performance of virtual teams.

There are several definitions given in the communication between virtual team members. According to Kashive *et al.* (2022, p.282), communication is defined as “the degree to which communication technology helps team members work in different spaces and times”. Moreover, communication is defined as “the activity of conveying information through the exchange of thoughts, messages, or information to create a shared understanding” (Thanthony, 2021, p.7). Furthermore, communication is defined as “the process of sharing information, feelings, thoughts, ideas, and messages with others” (Aung, 2022, p.2).

Communication between virtual team members is the lifeblood of virtual teams. COVID-19, globalisation, and a shift toward telecommuting have caused many teams to transition to virtual environments, which has increased the need for learning how to be intentional with communication with other team members in order to collaborate and advance projects with successful outcomes (Willox *et al.*, 2023). Communication is one of the main challenges facing virtual teams. The extensive literature review revealed that communication issues are among the issues virtual teams face (Sagar *et al.*, 2022). Challenges related to communication result from

various reasons such as different time zones, more difficult coordination, language barriers, and difficulties related to technology (Zaharie, 2021b).

There are negative consequences for the absence of effective communication between members of the virtual team. Lack of good communication causes delays in giving comments and prevents all participants from having a common frame of reference. Additionally, it results in variations in how written content is interpreted and guarantees involvement from remote team members (Sagar *et al.*, 2022). Previous studies have shown that virtual teams perform better when there is consistent communication rather than when there is inconsistency in communication (Kashive *et al.*, 2022). In a virtual context, conflict is more likely since communication is less spontaneous and more prone to misunderstandings due to the absence of nonverbal cues (Willox *et al.*, 2023).

Effective communications between team members contribute to the performance of the virtual team. The success of a virtual team depends on efficient communication. Performance in virtual teams depends on effective communication, it serves as the foundation for creating high-performance work procedures and strategies (Sagar *et al.*, 2022). It makes sense that developing a communication strategy can improve team performance (Willox *et al.*, 2023). Effective communication among team members fosters a more amicable team climate, which in turn improves team performance (Miaohui *et al.*, 2022).

2.6 VIRTUAL LEADERSHIP

Virtual leadership has become increasingly used in virtual teams in recent years. The current study presents the emergence of virtual leadership and its concept, the importance of virtual leadership, the challenges facing virtual leadership, theories of virtual leadership, and the relationship of virtual leadership to the performance of virtual teams.

Researchers have provided many definitions of virtual leadership but despite this, there is still a difference in defining the characteristics of virtual leadership. Prior

literature has indicated that virtual leadership has the same concept as E-leadership (Ben Sedrine *et al.*, 2020; Butt *et al.*, 2022; Chaudhary *et al.*, 2022). With the introduction of cutting-edge technologies into the company, the role of leadership has changed significantly. E-leadership is the word for this technology-mediated leadership, which combines traditional leadership with awareness of, adoption of, and use of information and communication technologies (ICTs) for oneself and an organisation (Gupta *et al.*, 2022). In addition, E-leadership is defined as “a process of social influence mediated by advanced information and technologies producing changes in attitudes, feelings, thoughts, behaviour and/or performance of individuals, groups and/or organizations“ (Ben Sedrine *et al.*, 2020, p.2). Additionally, virtual leadership has been defined as following “a process of social influence embedded in both proximal and distal AIT- mediated contexts that can change attitudes, emotions, thought, actions, and performance” (Soon & Salamzadeh, 2020, p.225).

The importance of virtual leadership has increased after the great transformation of organizations to work from the traditional method to the virtual method. Organizations have been forced to aggressively embrace virtual working due to social distancing agreements, which has accelerated this shift towards virtual working during COVID-19 (Mysirlaki & Paraskeva, 2020). However, even after COVID-19, most companies are now making a strategic choice to switch between working days from the office and working from home. At a time when businesses and organizations are changing rapidly, it is essential to focus on a leadership position within the virtual team to lead this significant transformation (Mutha & Srivastava, 2021). With the growing use of virtual teams in businesses and organizations, it is essential to comprehend how virtual leaders work (Ben Sedrine *et al.*, 2020).

There are significant challenges facing virtual leadership as most organizations increasingly turn to virtual work. Adopting new technology is a problem for leaders who want to exercise effective leadership in the digital sphere. Virtual leaders face two different sorts of issues: those related to the virtual form and the usual challenges of traditional teams (Ben Sedrine *et al.*, 2020). From both an organisational and a personal perspective, leaders' use of ICT has an impact on their effectiveness (Gupta *et al.*, 2022). Due to the low level of F2F relationships compared to traditional teams,

new challenges arise for virtual leadership, such as coordination and control of virtual teams (Mysirlaki & Paraskeva, 2020). When leaders are physically separated from their teams and communicate online, the dynamic of the workplace and the work culture increase the challenges for leaders (Gupta *et al.*, 2022). Moreover, varieties of virtual cooperation provide difficulties for team members and their leaders, such as removing obstacles to communication, establishing trust, or preserving team cohesion (Mayer *et al.*, 2023). Working remotely can have detrimental effects on an employee's wellness, like as isolation, misunderstanding, ambiguity, diminished interpersonal contact, being overworked, and not getting enough downtime, therefore, it is crucial to talk about how an e-leader may support employees who work in GVTs in managing their emotional issues (Chaudhary *et al.*, 2022). In comparison to F2F teams, leadership in virtual environments is in fact more difficult. It takes more work than in a traditional team environment to coordinate within teams, establish trust, create shared mental models, and handle conflict (Ben Sedrine *et al.*, 2020).

There are many theories that shed light on leadership in the virtual workplace. The body of prior research underlines that the new virtual environment does not lend itself to the employment of conventional leadership styles (Elyousfi *et al.*, 2021a). Previous studies indicate that there is a relationship between the type of leadership such as transformational leadership and transactional leadership the effectiveness of the virtual team (which includes the performance and satisfaction of employees) (Ben Sedrine *et al.*, 2020). Nevertheless, despite these efforts, there remains a lack of comprehensive knowledge regarding the functions of leadership styles in enhancing the effectiveness of virtual teams. Hence, for instance, there were no studies indicating the role of situational leadership in the performance of the virtual team, which this study tries to shed light on.

Recent developments in the educational sector have shown the need for virtual leaders. The educational institution's adoption and reliance on recent technologies has highlighted the need for leaders who are tech aware and e-skilled to manage the team by integrating technologies and successfully leading through virtual communication platforms. Thus, it is necessary to transition educational leaders into virtual leaders (Gupta *et al.*, 2022). Moreover, due to the rapid growth of technology in education, e-

leadership has become essential for institutions of higher education. Adopting technology is a distinctive trait of effective educational leaders (Gupta *et al.*, 2022).

The virtual leader plays a prominent role in improving the performance of virtual teams. The importance of leaders in performance management was also underlined. Therefore, leaders are crucial to the team's effectiveness, particularly in times of crisis (Kashive *et al.*, 2022). Prior literature has agreed that effective leadership plays a critical role in the success of virtual teams (Eseryel *et al.*, 2020; Efimov *et al.*, 2020; Seftyandra, 2020; Turesky *et al.*, 2020; Zeuge *et al.*, 2020). Virtual leadership in virtual teams plays a key role in the efficiency of the team as well as it is considered the big five contributors to the efficiency of the team (Ben Sedrine *et al.*, 2020). As the team's virtual leader, they set an example by making sure that goals are met on time and with high quality (Bekirogullari & Thambusamy, 2020).

There are few current studies on virtual leadership. Virtual leadership is still in its very early stages of growth, so a solid framework for virtual leadership needs to be created (Kashive *et al.*, 2022). The current study contributes to strengthening the body of prior knowledge about virtual leadership in virtual teams in Higher Institutions.

2.7 KNOWLEDGE SHARING

Knowledge sharing is one of the factors taken into consideration in virtual teams. For firms aiming to manage their intellectual capital efficiently to increase organisational performance and competitive advantage, knowledge sharing among workers using Knowledge Management Systems (KMSs) or IT has emerged as a key tactic (Chung *et al.*, 2022). The team's capacity to exchange information effectively and clearly is largely what determines how comprehensive the knowledge is when it is shared (Majzoub *et al.*, 2020a). Knowledge sharing and collaborative exchanges become essential areas of study in the contemporary technical and informational climate within higher education as technology encourages simple access to information via

smartphones, tablets, and other devices (Singh, 2021). In the following paragraphs, the study discusses the concept and definition of knowledge sharing, the importance of knowledge sharing, the challenges of knowledge sharing in organizations, and the role of knowledge sharing in virtual team performance.

There are many definitions of knowledge sharing in previous studies. Knowledge sharing has been defined as “the process of transferring and sharing knowledge among individuals or teams to reduce the time spent on solving a business problem” (Natu & Aparicio, 2022, p.2). Knowledge sharing can be considered as “the combination of experience, values, contextual information, and expert insights that help evaluate and incorporate new experiences and information” (Yu *et al.*, 2022, p.3).

There is great importance to sharing knowledge among members of the virtual team. For VTs to be able to solve complicated issues and make judgments, information sharing is required (Majzoub, *et al.*, 2020a). Moreover, the manner in which virtual teams interact is different from how F2F teams do. VTs communicate with one another via ICT. Sharing knowledge can help understand how virtual teams are formed and how they work, it can also help create productive virtual teams by maintaining team collaboration and cohesion (Al Kaabi *et al.*, 2022). The difficulty faced by virtual teams in bringing together various points of view from team members might lead to a faulty flow of (Majzoub *et al.*, 2020a), thus sharing information is vital to avoid misunderstanding of information exchanged. It is evident that if the virtual teams cannot effectively convey and shape the culture of knowledge sharing and lifelong learning, the benefits and advantages of the internal information system advocated by the organization do not result in real feelings for employees (Chung *et al.*, 2022).

Knowledge sharing encounters many hurdles among virtual team members. There are many challenges to effective information sharing, including a lack of team identity and mutual trust (Majzoub *et al.*, 2020a). In contrast to collocated teams, discussions in virtual teams frequently take a more official tone and are more work-related. As a result, there are fewer possibilities for the informal and accidental information exchanges that frequently take place in common settings. The capacity of

a virtual team to exchange information is thus hampered (Morrison-Smith & Ruiz, 2020). Moreover, the degree of geographic and cultural distance is the main obstacle to knowledge exchange in virtual teams (Davidavičiene *et al.*, 2020).

Previous research shows a connection between knowledge sharing and virtual team performance. According to the findings of earlier research, information sharing improves a virtual team's performance (Natu & Aparicio, 2022). Furthermore, it has been shown that knowledge sharing is a crucial component of team performance and is necessary for a GVT to succeed (Majzoub *et al.*, 2020). This suggests that knowledge sharing may have a major impact on the success or failure of virtual teams' performance (Al Kaabi *et al.*, 2022). Sharing knowledge is crucial for creativity, problem-solving, and decision-making in the virtual temporal environment, which makes it crucial for success (Swart *et al.*, 2022).

2.8 MEDIA RICHNESS

Several studies have addressed media richness as one of the essential elements in the virtual team environment. The current study will highlight the concept of media richness and the definition related to it, as well as the role it plays in communication between members of the virtual teams, its cohesion and building trust between them, as well as the role of media richness in the performance of the virtual team.

There are several concepts discussed by researchers for media richness. The term "media richness" is described as "technology's capacity for instant response, vocal and nonverbal cues, and message personalization, additionally, it is the capacity to combine all information, to offer prompt feedback, and to create a customised language for each member" (Ben Sedrine *et al.*, 2020, p.6). Moreover, according to Yaghmai and Bøe (2021, p.10) media richness reflects "the capacity to convey information between managers". Furthermore, media richness has been defined as "The ability of technology to provide immediate feedback, verbal and non-verbal signals and to personalize messages" (Ben Sedrine *et al.*, 2020, p.6).

Media richness plays a vital role in the virtual team, and this role differs if media richness is high or low. According to Yaghmai and Bøe (2021), low media richness has a reduced potential to communicate information through facial expressions, gesticulations, and verbal cues, and these qualities enable technologies to convey socially richer information, and ultimately, the feeling of social presence. Moreover, Yaghmai and Bøe (2021) furthermore, leaders can limit feedback and reduce the likelihood of resolving ambiguous situations by communicating through low-richness media, on the other hand, more complex and personal messages will be more likely to be processed in media with more media richness. First and foremost, real leaders in virtual teams establish clear objectives and manage workflow. Members of virtual teams typically communicate online due to distance or other issues. Because nonverbal and vocal clues are absent in text-based internet conversation, there is a higher chance of misunderstandings (Zhang *et al.*, 2022).

2.9 UNDERLYING THEORIES

Theories of Media Richness Theory (MRT), Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET) were taken into account to explain the relationships between the factors in the conceptual model of the current study (research hypotheses). In the context of the current study, SPT theory employed to explain the relationship between the variables (social presence, knowledge sharing, virtual team performance) in the first, fourth, and sixth hypotheses (H1, H4, H6). Furthermore, SLT theory was employed to explain the relationships between the variables (virtual leadership, knowledge sharing, virtual team performance) in the second, fifth, and seventh hypotheses (H2, H5, H7). Moreover, SET theory was employed to explain the relationships between the variables (knowledge sharing, and virtual team performance) in the third hypothesis (H3). Finally, MRT theory was employed to explain the relationships between the variables (social presence, virtual leadership, media richness, and virtual team performance) in the eighth and ninth hypotheses (H8, H9). Below the study will discuss the previous four theories within the framework of the current study.

2.9.1 Social Presence Theory

The beginning of the emergence of SPT theory dates back to the 1970s. Research on social presence in communication dates back to the 1970s, when it was first investigated within the framework of a symbolic interactionist paradigm in social psychology, this paradigm explained how communication partners are formed through interaction, particularly talking (Jones, 2023; Satya & Shauki, 2022). SPT theory was established by Short *et al.* (1976) which can be defined as “the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships”, this theory from the foundations of interpersonal communication and symbolic interactionism (Flak & Pyszka, 2022, p.54). Additionally, SPT theory has been defined as "the degree to which a person perceives a context such as leadership presence as real in mediated communication" (Showell, 2023, p.68,69). Moreover, SPT theory has stated that posits that more nonverbal and synchronous communication leads to more positive outcomes due to increased feelings of social presence in the interaction (Hollebeek and Macky, 2021; Jones, 2023).

SPT theory is commonly used in virtual teams. For instance, when it comes to virtual teams, one of the prevalent theories in earlier research is the SPT theory (Alkoud *et al.*, 2023b). Moreover, Chang *et al.* (2023) argue that SPT theory is one of the most common theories applied in virtual team environments to understand, explain, and describe people's social interactions. Moreover, in the context of virtual environments, SPT theory explains how ICT users experience a shared environment even when they are not physically present in the same space (Jones, 2023). Additionally, according to the SPT theory, media's varying capacities to transmit verbal and visual cues account for their differences in their capacity to elicit the psychological impression that other people are physically there (Lamovšek & Černe, 2023). Furthermore, social presence refers to the feeling of being with other persons in a media-mediated environment (Jang & Choi, 2022).

SPT theory tends to pay attention to the human aspects among team members, as it seeks to provide a strong social environment to increase confidence in

communication, a sense of belonging, cohesion, and building relationships among team members. In the context of virtual work, SPT theory shows that the level of presence varies depending on the richness of the media tool, the degree of social presence that arises when people connect online is determined by the internet tools. People could be more socially present if they could see and communicate with one another, and vice versa (Wut *et al.*, 2024). Figure 2.4 shows the contribution of mediator richness to increasing social presence in virtual teams.

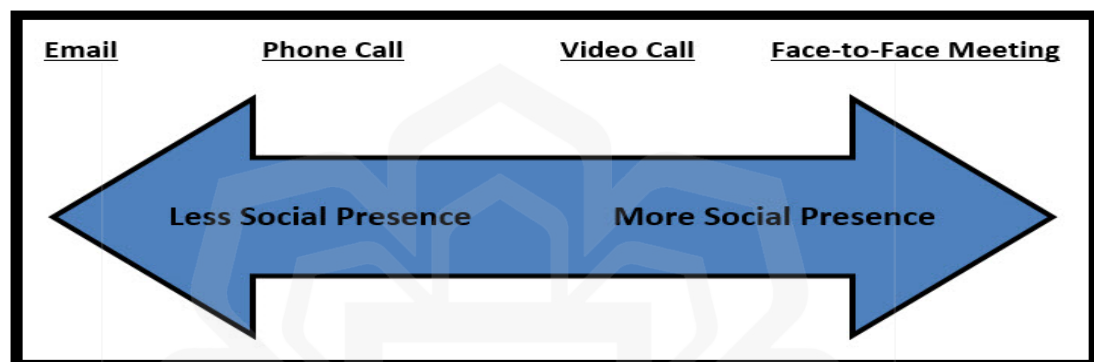


Figure 2.4 Social Presence Levels according to Media Richness
Sources: *Developed by the researcher based on prior studies (Flak & Pyszka, 2022; Showell, 2023)*

Finally, there are recent empirical studies that have relied on this theory to explain the influence of factors on the performance of virtual teams, such as the study of Davidaviciene *et al.* (2020) ; Jones (2023); and Showell (2023). In the context of the current study, this theory will be employed to explain the relationship between the variables (social presence, knowledge sharing, virtual team performance) in the first, fourth, and sixth hypotheses (H1, H4, H6).

According to the SPT theory, Employees behave and perceive others in mediated situations as if they were in person. When it comes to sharing knowledge, social presence is crucial since it fosters team cohesion, communication, relationship building, and trust. These factors, in turn, positively affect people's willingness to share information in a group or organizational setting. This supports the relationship between social presence and knowledge sharing (H1).

A framework for enhancing virtual teams and VHRD is offered by SPT theory (Bickle *et al.*, 2019). In virtual teams, social considerations play a crucial role. Building relationships, trust, cohesiveness, and communication are some of the key social elements that influence virtual team satisfaction and team performance (Lin *et al.*, 2008; Bickle *et al.*, 2019; Ben Sedrine *et al.*, 2020; Singh *et al.*, 2021). Many scholars have used SPT theory in virtual collaborations. According to Bickle *et al.* (2019), in the context of global human resource development, it is necessary to create a suitable social setting to promote communication, foster trust, enhance team cohesion, and raise feelings of respect, community, belonging, and satisfaction. Establishing a strong computer-based communication model is necessary to improve the virtual team's identity in a virtual setting by fostering social presence and cooperation skills. Additionally, Bickle *et al.* (2019) have found that social presence improves engagement and communication. This supports the relationship between social presence and team performance (H4).

2.9.2 Situational Leadership Theory

The most advanced emergency theory is SLT theory, which is predicated on situational factors in the workplace. SLT theory is the most developed model of emergency theories and is based on situational variables in the work environment (Claus, 2021). SLT theory assumes that no single leadership style is the best among leadership styles. Instead, this theory suggests that leadership style depends on the current situation and situational variables because it depends on the leader's daily perceptions as well as environmental observations (Manyuchi & Sukdeo, 2021; Claus, 2021).

SLT theory was established by Dr. Paul Hersey and Ken Blanchard in 1969 (Manyuchi & Sukdeo, 2021). SLT theory argues that “instead of using just one style, successful leaders should change their leadership styles based on the maturity of the people they are leading and the details of the task. Using this theory, leaders should be able to place more or less emphasis on the task, and more or less emphasis on the

relationships with the people they're leading, depending on what's needed to get the job done successfully”(Hersey & Blanchard, 2012, p.1).

In the context of team performance, according to the SLT theory, individuals within the team differ in terms of maturity level, so the leader evaluates the level of development of his subordinates and then adjusts the leadership style accordingly. Therefore, the best and most effective leaders are the ones who can adapt their style to the circumstances, tasks, and nature of the team (Manyuchi & Sukdeo, 2021, Cuaresma-Escobar, 2021). Figure 2.5 shows the Situational Leadership Model.



Figure 2.5 Situational Leadership Model by Arvidsson *et al.* (2007)
Source: (Manyuchi & Sukdeo, 2021).

According to SLT theory, there are levels of maturity of individuals within the team and there are 4 main styles of leadership accordingly. According to the Hersey-Blanchard model, the following four leadership styles differ according to the maturity levels of team members as follows (Cuaresma-Escobar, 2021):

- 1) Low Maturity (M1)—Telling (S1)
- 2) Medium Maturity (M2)—Selling (S2)
- 3) Medium Maturity (M3)—Participating (S3)
- 4) High Maturity (M4)—Delegating (S4)

Matrix of primary leadership styles and different levels of maturity are shown in Table 2.11:

Table 2.11 Matrix of the Hersey-Blanchard Model Maps

	Four Primary Leadership Styles (S1, S2, S3, S4)	
Four Different Levels of Maturity (M1,M2,M3,M)	Participating (S3): In this approach, the leader offers less direction and allows members of the team to take a more energetic role in coming up with ideas and making decisions. M3: Team members have the skills and competence to complete the task but are reluctant to take accountability.	Selling (S2): Leaders sell their designs and message to get team members to buy into the process. M2: Team members are willing and eager but lack the capability.
	Delegating (S4): This style is characterized by a less involved, detached approach to leadership. Team members tend to make most of the decisions and take most of the accountability for what happens. M4: Team members are highly accomplished and willing to complete the task.	Telling (S1): In this leadership style the leader tells people what to do and how to do it. M1: Team members lack the knowledge, skills, and readiness to complete the task.
	The Hersey-Blanchard model maps each leadership style to each maturity level	
	Maturity Level	Most Appropriate Leadership Style
	M1: Low maturity	S1: Telling/directing
	M2: Medium maturity, limited skills	S2: Selling/coaching
	M3: Medium maturity, higher skills but lacking confidence	S3: Participating/supporting
	M4: High maturity	S4: Delegating

Source: developed by the researcher depending on (Manyuchi & Sukdeo, 2021) study

There is empirical evidence of the effectiveness of SLT theory in periods of crises and new circumstances, such as virtual work, the demand for which has increased after COVID-19. For instance, in Philippines, a recent study by Francisco

and Nuqui (2020) during the COVID-19 in the education sector in the Philippines indicates that situational leadership contributed to adapting to changes and new conditions in the country that this theory emerged due to the unusual conditions in workers during the crisis and that this theory was expanded to be more digital in nature due to the use of technology in situational leadership during a pandemic. In Ireland, another study conducted by Brown *et al.* (2021) indicates that leaders in the education sector in Ireland spoke about the importance of situational leadership, which has become the virtual strategy for dealing with the many challenges faced by employees in the education sector during COVID-19.

As demonstrated, situational leadership is the most popular theory in times of crisis and changing circumstances due to the flexibility of this leadership style, and in light of HEIs in Malaysia provide educational services virtually and this transformation requires technical skills for virtual work teams, situational leadership is most appropriate in this case because it takes in consider the maturity levels, abilities, and skills of virtual team members. Last but not least, Goleman and Blanchard concur that success comes from flexibility (Hersey & Blanchard, 2012). SLT theory guides leaders to change their leadership style according to the unusual circumstances experienced by their organizations. This leadership is characterized by flexibility according to circumstances and according to the maturity levels and capabilities of team members. This theory is commonly used in crises and emergency conditions such as COVID-19 (Francisco & Nuqui, 2020; Brown *et al.*, 2021).

In the context of the current study, SLT theory will be employed to explain the relationships between the variables (virtual leadership, knowledge sharing, virtual team performance) in the second, fifth, and seventh hypotheses (H2, H5, H7). According to SLT theory, virtual leadership is about establishing a knowledge-sharing-friendly atmosphere by using technology to improve communication, build trust across geographical boundaries, increase transparency, and promote knowledge sharing among team members. This supports the relationship between virtual leadership and knowledge sharing (H2).

Given that leaders must adapt their leadership style to succeed in a virtual setting, SLT theory suggests that the situational virtual leader style is appropriate for a virtual setting (Clark, 2019). According to Morrison-Smith and Ruiz (2020), virtual employees require different skills and qualifications than traditional employees. They are also impacted by social and emotional aspects, distance, trust, motivation, and the challenge of dispute. Employees who transition to a virtual workplace may have greater technology hurdles and opportunities for teamwork. Here, the virtual leader overcomes these obstacles by employing the situational method (Morrison-Smith & Ruiz, 2020). This supports the relationship between virtual leadership and virtual team performance (H5).

2.9.3 Social Exchange Theory

The behavioural psychology approach is presented by social exchange theorist Blau (1964) in an effort to explain human relationships through the dynamics of rewards and benefits. This idea shows that people learn through observation and is strongly related to the social learning hypothesis (Zeb *et al.*, 2023). SET theory is one of the theories widely used in the context of human resources. Humane resource management, and more especially employee outcomes, can be predicted using the framework that SET theory offers (Afshari *et al.*, 2023). According to the SET theory, a framework of exchange underpins all social interactions. According to the social exchange hypothesis, when people connect with one another, they maximize their benefits and minimize their costs (Xu *et al.*, 2022). In order to preserve this fruitful exchange relationship, one party feels obliged to return favours when they obtain benefits from another (Tsen *et al.*, 2021; Xu *et al.*, 2022). Figure 2.6 represents SET theory.

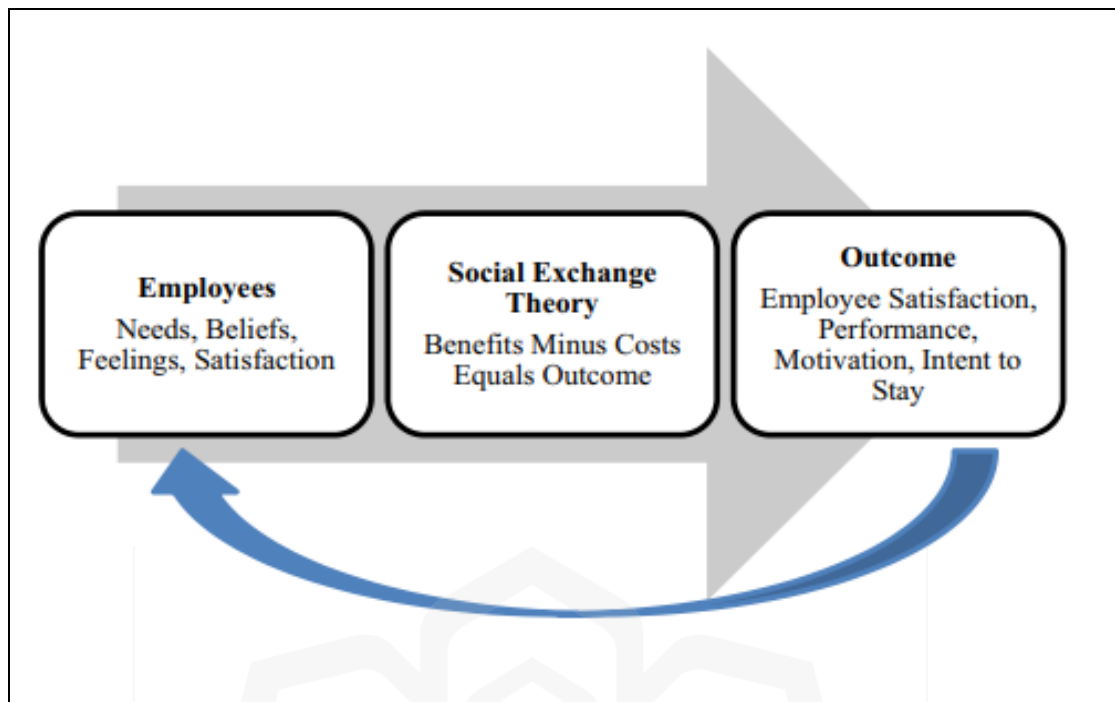


Figure 2.6 Social Exchange Theory
Source: (Pham *et al.*, 2023)

It is common to use SET theory to explain knowledge sharing between team members. According to Nguyen *et al.* (2023), Blau (1964) argues that the SET theory emphasizes that people engage in social exchanges with others, offering their personal knowledge and resources in the hope of receiving something in return. SET theory states that when workers feel valued and supported by their employer, they are more likely to contribute significantly to the growth of the company. Employees' contributions during times of crisis are demonstrated by the way they use technology to share knowledge and assist others in completing tasks by either providing or requesting knowledge (Nguyen & Malik, 2020)

In the context of the current study, SET theory will be employed to explain the relationships between the variables (knowledge sharing, and virtual team performance) in the third hypothesis (H3). The relationship between knowledge sharing and virtual team effectiveness is explained by the reciprocity of sharing crucial information among team members within the context of SET theory. This enhances team cohesiveness, trust, and problem-solving abilities through collaboration

and innovation, which eventually results in better team performance (Morrison-Smith & Ruiz, 2020).

2.9.4 Media Richness Theory

Previous studies show that MRT theory is commonly used in virtual teams. A recent study that examined the content of 130 articles on virtual teams showed that MRT theory is one of the frequently used theories in the virtual work environment (Chang *et al.*, 2023). MRT theory was introduced by Richard L. Daft and Robert H. Lengel in 1986, it is considered an extension of Information Processing Theory (Daft & Lengel, 1986). MRT theory has been used to evaluate the richness of certain communication tools, for instance, phone calls, emails, and video conferencing. A phone call, for example, cannot present body language signals and gestures, therefore it is considered less rich than video conferencing. According to Daft and Lengel (1986), MRT theory showed that the organization's ability to process information with suitable richness communication tools determines organizational success by minimizing uncertainty and clarifying equivocality. MRT theory or Information Richness Theory illustrates the differences in ability of communication tools to transfer information among members. The essential motivation when we select the communication medium for a specific message is to reduce the possible misinterpretations of messages delivered among members. Figure 2.7 shows the media richness from the least richness to the highest richness.

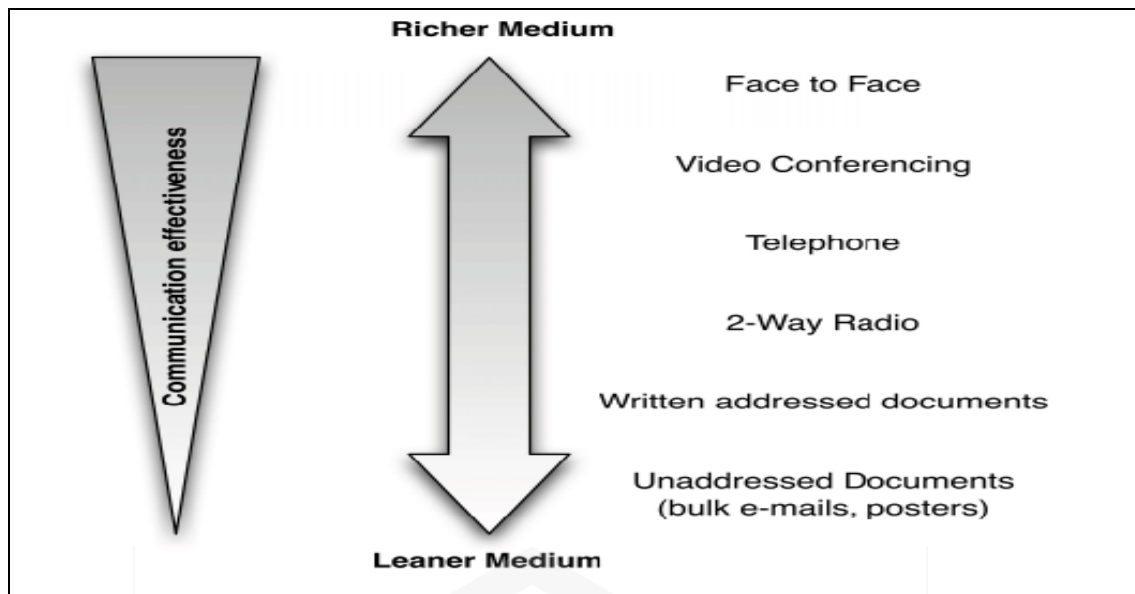


Figure 2.7 Media Richness Theory
Source: (Za & Braccini, 2012)

MRT theory provides an important framework for understanding the proportionality of media richness to the complexity of the task to be performed and the degree of performance required. According to MRT theory, there are four capabilities of media: first, instant feedback (quickly receiving and delivering messages), second, personal focus (the ability to customize the message according to the status of the recipients), and third, linguistic diversity (availability of a wide range of symbols that can be used to convey) a group fourth, a wide range of meanings, multiple messages (which is the number of communication channels to compose messages) (Liao *et al.*, 2020). One of the main requirements in the virtual team environment is to match the type of ICT with the central mission (Caligiuri *et al.*, 2020). Liao *et al.* (2020) have highlighted that, the MRT theory is widely applied in research involving communication including management communication, and elements of MRT theory have a variety of influences across information communication technology.

In the current study, the adoption of the MRT theory is considered the essential step toward choosing suitable alternatives among communication media tools to enhance virtual team performance, communication effectiveness, and social relationships among members. In addition, there are empirical studies that have relied

on this theory in developing the study model to examine the effect of factors on the performance of virtual teams, such as (Ben Sedrine *et al.*, 2020; Soon & Salamzadeh, 2020; Winter, 2020; Zoltek, 2020; Davidaviciene *et al.*, 2020; Kanse *et al.*, 2023).

In the context of the current study, MRT theory will be employed to explain the relationships between the variables (social presence, virtual leadership, media richness, and virtual team performance) in the eighth and ninth hypotheses (H8, H9). According to MRT theory, when media attributes are matched with work requirements, using richer media improves virtual team performance, particularly for tasks with uncertainty (Zuofa & Ochieng, 2021). According to Baynum (2021), using rich media encourages team members to develop relationships and bonds. The media richness in the setting of a virtual workplace has been emphasized in earlier studies. Since the features of the media are matched with the tasks that must be completed, MRT theory states that utilizing a richer medium enhances virtual team performance, especially for confusing tasks (Zuofa & Ochieng, 2021). This supports the relationship between SP, MR, and VTP (H8). Moreover, since media richness makes it easier for users to transmit rich information, it can increase the efficacy of virtual teams (Liao *et al.*, 2020). Conversely, virtual team leadership has been found to greatly enhance team performance (Ab Wahab *et al.*, 2023; Kashive *et al.*, 2022; Elyousfi *et al.*, 2021; Zaw, 2022). Therefore, the degree of media richness may have an impact on this effect. This supports the relationship between VL, MR, and VTP (H9).

2.10 PRIOR EMPIRICAL STUDIES

the present study will review the literature of prior empirical studies that tested the relationships between the variables in the proposed study model. The current study only reviewed recent empirical studies from 2020 to 2024. The study will review the results of the empirical studies for each relationship between the previous variables and they were arranged according to research questions. The authors, date of the study, country, and sector to which the study was applied were mentioned.

2.10.1 Empirical Studies of Social Presence Practices and Knowledge Sharing

Table 2.12 summarizes prior empirical studies examining the relationship between social presence practices, particularly in relationship building, and knowledge sharing within organizational contexts. Two studies, conducted in China and Kenya, found positive correlations between knowledge sharing and relationship-building behaviours among newcomers in a technology company setting and among employees in Deposit-Taking Savings and Credit Cooperative Organizations (SACCOs) in Kenya.

Table 2.12 Prior Empirical Studies of SP Practices (RB) and K.Sh

H1: There is a significant positive relationship between social presence practices (relationship building, trust, cohesion, communication) and knowledge sharing.				
Relationship Building and Knowledge Sharing				
No	Author & year	Country	Sector	Results
1	(Zheng <i>et al.</i> , 2021)	China	Technology Company	The findings showed a positive correlation between information-sharing and the relationship-building behaviour of newcomers.
2	(Waititu & Barker, 2023)	Kenya	Deposit-Taking SACCOs Companies	Relationship building may help employees with their own knowledge sharing KS determinants.

The results show that knowledge sharing inside organisations is greatly aided by trust, both interpersonally and institutionally. Trust emerges as a crucial facilitator of information transmission across a wide range of industries, including mainland Chinese enterprises, significant Polish organisations, Indonesian financial companies, IT and software companies in China, and the apparel industry in Hong Kong. A collaborative and inventive organisational culture is fostered by trust, which fosters formal and informal knowledge sharing procedures through affect-based, cognition-based, or the perception of being trusted. Table 2.13 shows prior empirical studies of social presence practices (trust) and knowledge sharing conducted in a number of nations and industries.

Table 2.13 Prior Empirical Studies of SP Practices (TR) and K.Sh

H1: There is a significant positive relationship between social presence practices (relation building, trust, cohesion, communication) and knowledge sharing.				
Trust and Knowledge Sharing				
No	Author & year	Country	Sector	Results
1	(Lee <i>et al.</i> , 2020)	Hong Kong	Clothing Industry	Trust influence both formal and informal information exchange.
2	(Kmieciak, 2020)	Poland	large Polish Organization	The findings demonstrated a positive relationship between knowledge sharing, knowledge collection and both vertical and horizontal trust.
3	(Almadana <i>et al.</i> , 2022)	Indonesia	Financial Companies	Feeling trusted FT also positively impacts knowledge-sharing behavior KSB.
4	(Sabetzadeh & Chen, 2023)	China	Various Mainland Chinese Companies	Employees' willingness to share personal knowledge positively influenced by both institutional and interpersonal trust.
5	(Masood <i>et al.</i> , 2023)	China	IT Companies and Software Companies	The findings imply that the use of Enterprise social media promotes Affect based trust and cognition-based trust among employees, thereby enhancing knowledge sharing in the workplace.

Previous empirical research has been conducted on the relationship between social presence—more especially, cohesion—and knowledge sharing. Three studies from various fields and nations are emphasised: In SMEs in Germany, Scotland, Sweden, and Italy, Rossignoli *et al.* (2023) discovered that cohesiveness within a community of practice might either support or impede the flow of knowledge. Birhanu and Gugssa, (2024) noted that staff cohesion promotes effective communication and knowledge transfer in Ethiopian public universities. Without naming the nation, Wojciechowska-Dzięcielak (2020) concentrated on SMEs and proposed that group cohesion can improve knowledge transfer when led by people aware of the financial advantages. Table 2.14 shows prior empirical studies of social presence practices (cohesion) and knowledge sharing.

Table 2.14 Prior Empirical Studies of SP Practices (Coh) and K.Sh

H1: There is a significant positive relationship between social presence practices (relation building, trust, cohesion, communication) and knowledge sharing.				
Cohesion and Knowledge Sharing				
No	Author & year	Country	Sector	Results
1	(Wojciechowska-Dzięcielak, 2020)	Not Mentioned	SMEs	If the process is properly directed by those who are aware of the potential financial benefits of information sharing, group cohesion can improve the transfer of knowledge.
2	(Rossignoli <i>et al.</i> , 2023)	German, Scottish, Swedish, and Italian	SMEs Operating	Cohesion can either increase or decrease a community of practice's capacity for knowledge exchange.
3	(Birhanu And Gugssa, 2024)	Ethiopia	Public Universities	Cohesion among the personnel helps with knowledge transfer and effective communication.

Previous empirical research indicates the relationship between communication and knowledge sharing. Five studies from different nations and industries are featured. Koo *et al.* (2022) discovered in South Korea's private institutions that improved organisational communication amplifies the advantages of change-openness on knowledge exchange. In China, Masood *et al.* (2023) found that using enterprise social media in conjunction with clear communication promotes cognition-based trust, which in turn increases knowledge transfer. In South Korea's private universities, Kim *et al.* (2021) also underlined the importance of communication in fostering knowledge exchange when organisational justice and transformational leadership are guaranteed. In their investigation of Chinese high-tech companies, Fang *et al.* (2024) found that formal and informal communication positively correlated with open innovation. Table 2.15 displays previous empirical research examining the relationship between communication and knowledge sharing.

Table 2.15 Prior Empirical Studies of SP Practices (Com) and K.Sh

H1: There is a significant positive relationship between social presence practices (relation building, trust, cohesion, communication) and knowledge sharing.				
Communication and Knowledge Sharing				
No	Author & year	Country	Sector	Results
1	(Lee <i>et al.</i> , 2020)	USA	Industry Sectors	Employees' willingness to share knowledge is positively correlated with open and honest internal communication during a crisis.
2	(Kim <i>et al.</i> , 2021)	South Korea.	Private University	When organisational fairness and transformational leadership are guaranteed, communication plays a critical role in promoting knowledge sharing.
3	(Koo <i>et al.</i> , 2022)	South Korea	Private Universities	When there is more organisational communication, the benefits of congruence of openness to change on knowledge sharing will be more pronounced
4	(Masood <i>et al.</i> , 2023)	China	IT Companies and two Software Companies	Sharing of knowledge is increased when there is clear communication between the use of enterprise social media and trust based on cognition.
5	(Fang <i>et al.</i> , 2024)	China	High-Tech Enterprises	In open innovation projects (OIPs), formal and informal communication are positively correlated with knowledge sharing

2.10.2 Empirical Studies of Virtual Leadership and Knowledge Sharing

Prior empirical research indicates the relationship between virtual leadership and knowledge sharing. Five studies from various industries and nations are summarised. Employees in Pakistani industrial and service organisations modify their knowledge-sharing behaviour in a good way when they feel empowered by their leadership, according to Khatoon *et al.* (2022). Similarly to this, Singh *et al.* (2021) in the United Arab Emirates observed that competent virtual team leadership in service sector organisations is necessary for efficient virtual team management and information exchange. A meta-analysis by Yin *et al.* (2023) of 23 studies from various nations revealed the positive impacts of shared and distributed leadership on knowledge sharing. Anis *et al.* (2021) found a positive direct association between innovation,

leadership, and knowledge sharing in Indonesia's public colleges. Martela (2020) discovered that transformational, transactional, and creative leadership all had an impact on online knowledge sharing in Vietnam, with creative leadership having the most influence in business-to-business (B2B) settings. Table 2.16 reveals previous empirical research examining the relationship between virtual leadership and knowledge sharing.

Table 2.16 Prior Empirical Studies of VL and K.Sh

H2: There is a significant positive relationship between virtual leadership and knowledge sharing.				
Virtual Leadership and Knowledge Sharing				
No	Author & year	Country	Sector	Results
1	(Martela, 2020)	Vietnam	B2B Organizations	Online knowledge sharing was found to be impacted by transformational, transactional, and creative leadership, with creative leadership having the largest impact.
2	(Anis <i>et al.</i> , 2021)	Indonesia	Public Universities	The findings showed a favourable direct relationship between creativity, leadership, and knowledge sharing.
3	(Singh <i>et al.</i> , 2021)	United Arab Emirates (UAE)	Service Sector Firms	Effective virtual team management and knowledge sharing are both dependent on effective virtual team leadership.
4	(Khatoon <i>et al.</i> , 2022)	Pakistan	Manufacturing and Service Organizations	The findings showed that employee can change their knowledge sharing behaviour when they have empowered leadership.
5	(Yin <i>et al.</i> , 2023)	Different Countries	Meta-Analysis of 23 Studies Involving	Results showed that there were beneficial effects of dispersed and shared leadership on knowledge sharing.

2.10.3 Empirical Studies of Knowledge Sharing and Virtual Team Performance

Prior empirical studies have investigated the relationship between knowledge sharing and virtual team performance across diverse countries and sectors. Five studies are highlighted. Natu and Aparicio (2022) found in Portugal's ERP software development sector that knowledge sharing enhances virtual team performance. Similarly, in the

UAE's IT industry, Davidaviciene *et al.* (2020) demonstrated the critical role of knowledge sharing in GVTs. Al Kaabi *et al.* (2022) emphasized in UAE organizations that virtual team performance success is significantly influenced by knowledge sharing. Chung *et al.* (2022) found in Taiwan's Farmers' Associations (FAs) that the efficacy of virtual teams depends on members' beliefs in information sharing and collaboration. Last but not least, Swart *et al.* (2022) emphasised the value of knowledge sharing in virtual contexts for innovation, problem-solving, and decision-making, all of which are critical for the success of virtual teams across many nations and industries. Table 2.17 Demonstrates previous empirical research examining the relationship between knowledge sharing and virtual team performance.

Table 2.17 Prior Empirical Studies of K.Sh and VTP

H3: There is a significant positive relationship between knowledge sharing and virtual teams 'performance.				
Knowledge Sharing and Virtual Teams Performance				
No	Author & year	Country	Sector	Results
1	(Davidaviciene <i>et al.</i> , 2020a)	UAE	IT industry	It has been demonstrated that knowledge sharing is a critical element in team performance, and is essential to the success of a global virtual team (GVT).
2	(Natu & Aparicio, 2022)	Portugal	ERP Software Development	The results of previous study concluded that sharing knowledge increases the performance of the virtual team.
3	(Al Kaabi <i>et al.</i> , 2022).	UAE	UAE Organisations	This implies that the success or failure of the performance of virtual teams may be significantly influenced by knowledge sharing.
4	(Chung <i>et al.</i> , 2022)	Taiwan	Taiwanese Farmers' Associations (FAs)	The success and efficacy of virtual teams depend on how much their members' beliefs in information sharing, communication, and collaboration grow over time.
5	(Swart <i>et al.</i> , 2022)	Different Countries	Different Sector	In the virtual time context, sharing knowledge is essential for creativity, problem-solving, and decision-making, making it essential for success.

2.10.4 Empirical Studies of Social Presence Practices and Virtual Team Performance

Prior empirical studies have investigated the relationship between social presence activities, namely, relationship building and virtual team performance across diverse countries and sectors. Here is a summary of three studies from various nations and industries: Aarthi and Sujatha (2022) concluded that relationship building positively affects virtual team productivity in the Indian IT industry; Tan *et al.* (2019) found a favourable correlation between relationship building and team performance in Malaysian multinational companies; Lin *et al.* (2008) observed in Australian universities that relationship building indirectly influences performance through coordination mechanisms. Together, these results highlight how crucial it is to foster solid bonds among members of virtual teams to improve output and performance. Table 2.18 demonstrates previous empirical research examining the relationship between relationship building and virtual team performance.

Table 2.18 Prior Empirical Studies of SP Practices (RB) and VTP

H4: There is a significant positive relationship between social presence practices (Relationship Building, Trust, Cohesion, and Communication) and virtual teams' performance.				
Relationship Building and Virtual Teams Performance				
No	Author & year	Country	Sector	Results
1	(Lin <i>et al.</i> , 2008)	Australia	Western Australian Universities	Relationship Building influences Performance indirectly through Coordination.
2	(Tan <i>et al.</i> , 2019)	Malaysia	Multinational Companies	The findings showed that relationship building and team performance are significantly and favourably correlated.
3	(Aarthi & Sujatha, 2022)	India	IT industry	Relationship building has a positive effect on virtual team productivity.
Notes-1: Notes: The study of Lin <i>et al.</i> (2008) and Tan <i>et al.</i> (2019) from previous years were added to the empirical studies, because they are the studies that were relied upon to develop the model of the current study. Notes-2: study of Lin <i>et al.</i> (2008) developed by Tan <i>et al.</i> (2019) developed by the current study.				

Previous empirical studies have investigated the relationship between social presence activities, namely, trust and virtual team performance across diverse countries and sectors. Eight studies covering a range of nations and industries are summarised: Turesky *et al.* (2020) discovered a direct correlation between basic virtual team effectiveness and a high degree of trust in technology enterprises located in the USA and Canada. In a similar vein, Ben Sedrine *et al.* (2020) found that trust has a favourable effect on team performance in the IT sector in the Middle East and North Africa (MENA) area. In India, Kashive *et al.* (2022) discovered that e-trust has a major effect on team performance. According to Sagar *et al.* (2023), trust among team members significantly affects team performance in UK construction organisations. In the US IT sector, AlMarar *et al.* (2021) provided evidence of the statistics. Zaharie (2021) observed a correlation between trust and virtual team performance in Romania's higher education industry. In China's higher education industry, Yun *et al.* (2020) emphasised the important role that task team trust has in team productivity. Last but not least, Jafari (2021) discovered that a key predictor of virtual team performance in Holland's higher education system is team trust. Table 2.19 shows previous empirical research examining the relationship between trust and virtual team performance.

Table 2.19 Prior Empirical Studies of SP Practices (Tr) and VTP

H4: There is a significant positive relationship between social presence practices (Relationship Building, Trust, Cohesion, and Communication) and virtual teams' performance.				
Trust and Virtual Teams Performance				
No	Author & year	Country	Sector	Results
1	(Turesky <i>et al.</i> , 2020)	USA and Canada	Technology Companies	High level of trust-related directly with foundational of virtual teams' performance
2	(Ben Sedrine <i>et al.</i> , 2020)	MENA region	IT sector	Trust has positive influence on team performance.
3	(Yun <i>et al.</i> , 2020)	China	Higher Education	The impact of task team trust on team performance is significant.
4	(Zaharie, 2021)	Romania	Higher Education	Trust is associated to the performance of the virtual team.
5	(AlMarar <i>et al.</i> , 2021)	USA	(IT) industry	The findings showed that the model could statistically predict the association between virtual team performance and organisational trust

6	(Jafari, 2021)	Holland	Higher Education	team trust is a major predictor of virtual team performance and, eventually, favourably influences team performance
7	(Kashive <i>et al.</i> , 2022)	India	Not Mentioned	The results indicated that e-trust impact team performance.
8	(Sagar <i>et al.</i> , 2023)	UK	Construction Companies	The level of trust among team members has a big impact on the performance of the team.

There are empirical research that have previously indicated the relationship between cohesion and virtual teams' performance. Here is a summary of five studies from different nations and industries: Holle (2021) discovered a strong correlation between cohesion and performance in the US sports industry; In the IT sector in MENA area, Ben Sedrine *et al.* (2020) found that strong team cohesion increases team performance; Chaudhary *et al.* (2022) carried out a meta-analysis spanning multiple nations and industries, indicating that cohesion has a significant influence on the effectiveness of virtual teams; Team cohesion has a considerable impact on learning and performance, according to Ghanbari's (2022) research in Iraq's education sector. Moreover, Sinz (2020) conducted an analysis across multiple countries and industries, corroborating the positive relationship between team cohesion and performance. Table 2.20 shows previous empirical research examining the relationship between cohesion and virtual team performance.

Table 2.20 Prior Empirical Studies of SP Practices (Coh) and VTP

H4: There is a significant positive relationship between social presence practices (Relationship Building, Trust, Cohesion, and Communication) and virtual teams' performance.				
Cohesion and Virtual Teams Performance				
No	Author & Year	Country	Sector	Results
1	(Ben Sedrine <i>et al.</i> , 2020)	Middle East and North Africa, MENA region	IT sector	The results proved that a high level of cohesion leads to an increase in team performance.
2	(Sinz, 2020)	Various Countries	Various Industries	The analysis's findings support the notion that team cohesion and performance are positively correlated.

3	(Holle, 2021)	USA	Sport Sector	The results indicated a significant association between cohesion and performance.
4	(Chaudhary <i>et al.</i> , 2022)	various countries meta-analysis	Various Sector Meta-Analysis	The meta-analysis demonstrates that cohesion has a major impact on virtual team performance.
5	(Ghanbari, 2022)	Iraq	Education	Team cohesion had a direct, favourable, and significant impact on learning and performance.

There are empirical research that have previously indicated the relationship between communication and virtual teams' performance. Five studies are summarised, spanning various nations and industries: Miaohui *et al.* (2022) noted in China's education sector that communication frequency significantly improves team performance; Halim *et al.* (2021) found in Malaysia's Fire and Rescue Department a strong correlation between team performance and communication; AlMarar *et al.* (2021) found in the USA's IT industry a significant correlation between communication and virtual team performance; Semvua *et al.* (2024) found that team communication affects employee performance in Tanzania's commercial banks; Arifin *et al.* (2022) concluded that good virtual team communication improves performance in Indonesia's education, telecommunications, transportation, and environmental management sectors. Table 2.21 shows previous empirical research examining the relationship between communication and virtual team performance.

Table 2.21 Prior Empirical Studies of SP Practices (Com) and VTP

H4: There is a significant positive relationship between social presence practices (Relationship Building, Trust, Cohesion, and Communication) and virtual teams' performance.				
Communication and Virtual Teams Performance				
No	Author & year	Country	Sector	Results
1	(AlMarar <i>et al.</i> , 2021)	USA	(IT) industry	The findings showed that there is a significant correlation between communication and virtual team performance.

2	(Halim <i>et al.</i> , 2021)	Malaysia	Fire and Rescue Department of Malaysia (FRDM).	The findings showed a strong and favourable correlation between team performance and communication.
3	(Miaohui <i>et al.</i> , 2022)	China	Education	According to the results, the frequency of communication significantly improves team performance.
4	(Arifin <i>et al.</i> , 2022)	Indonesia	Environmental Management Sector, Education, Telecommunications, and Transportation	The study's conclusions demonstrate that effective virtual team communication can enhance performance in the field of environmental management.
5	(Semvua <i>et al.</i> , 2024)	Tanzania	Commercial Banks	The study found that employee performance in commercial banks is influenced by team communication.

2.10.5 Empirical Studies of Virtual Leadership and Virtual Team Performance

Prior empirical studies have investigated the relationship between virtual leadership and virtual team performance across diverse countries and sectors. Virtual team leadership has been shown to significantly improve team performance in Malaysia's GICS sector, according to Ab Wahab *et al.* (2023) and Kashive *et al.* (2022) observed in India that e-leadership impacts virtual team performance during the COVID-19 pandemic; Elyousfi *et al.* (2021) found in Canada's largest public organisations that perceived e-leadership significantly impacts virtual team performance; Zhang *et al.* (2022) found in China's MBA student population that real leadership positively impacts virtual team performance; Zaw (2022) concluded in Myanmar's telecommunications industry that virtual leadership methods enhance staff performance, confirming their significance for worker performance and work engagement. Table 2.22 shows previous empirical research examining the relationship between virtual leadership and virtual team performance.

Table 2.22 Prior Empirical Studies of VP and VTP

H5: There is a significant positive relationship between virtual leadership and virtual teams' performance.				
Virtual Leadership and Virtual Teams' Performance				
No	Author & year	Country	Sector	Results
1	(Elyousfi <i>et al.</i> , 2021a)	Canada	Largest Canadian Public Organizations	Virtual team VT performance is significantly impacted by perceived e-leadership, which encompasses a leader's Behaviour, communication/coordination, and trustworthiness.
2	(Kashive <i>et al.</i> , 2022)	India	Companies which experienced of working in a virtual team environment during COVID-19	E-leadership did have an impact on the virtual team's performance as a unit.
3	(Zhang <i>et al.</i> , 2022)	China	Students of the MBA	The findings of the study show that virtual team performance can be positively impacted by real leadership.
4	(Zaw, 2022)	Myanmar	Telecommunication Industry	The enhancement of staff performance is a result of the leaders' virtual leadership methods. The results of this study confirmed the significance of virtual leadership techniques for worker performance and work engagement.
5	(Ab Wahab <i>et al.</i> , 2023)	Malaysia	Companies listed in GICS sector	It has been discovered that virtual team leadership significantly improves the performance of teams.

2.10.6 Empirical Studies of Social Presence Practices, Knowledge Sharing and Virtual Team Performance

Previous empirical research indicated the relationship between social presence, knowledge sharing, and virtual teams' performance. It focuses on hypothesis H6, which postulates that knowledge sharing mediates the relationship between social presence and virtual teams' performance. The two main relationships are shown in the table: H1 shows a clear correlation between social presence and knowledge sharing, which is backed up by a number of studies provided, and H3 shows a clear correlation

between knowledge sharing and the effectiveness of virtual teams, which is also supported by studies cited. Nevertheless, H6, which suggests that information sharing mediates the relationship between social presence and virtual teams' performance, has not been examined in the literature to far, pointing to a knowledge vacuum that needs to be filled. Table 2.23 demonstrates previous empirical research indicating the relationship between social presence, knowledge sharing, and virtual teams' performance.

Table 2.23 Prior Empirical Studies of SP Practices and VTP, K. Sh

H6: The relationship between social presence and virtual teams' performance is mediated by knowledge sharing.		
SP → K. Sh → VTP		
No	Relationship	Sources
H1	$SP \rightarrow K.Sh$	(Zheng <i>et al.</i> , 2021); (Waititu & Barker, 2023); (Waititu & Barker, 2023); (Kmieciak, 2020); (Masood <i>et al.</i> , 2023); (Almadana <i>et al.</i> , 2022); (Lee <i>et al.</i> , 2020); (Rossignoli <i>et al.</i> , 2023); (Birhanu And Gugssa, 2024); (Wojciechowska-Dzięcielak, 2020); (Koo <i>et al.</i> , 2022); (Masood <i>et al.</i> , 2023); (Kim <i>et al.</i> , 2021); (Fang <i>et al.</i> , 2024); (Lee <i>et al.</i> , 2020).
H3	$K.Sh \rightarrow VTP$	(Natu & Aparicio, 2022); (Majzoub, <i>et al.</i> , 2020a); (Al Kaabi <i>et al.</i> , 2022); (Chung <i>et al.</i> , 2022); (Swart <i>et al.</i> , 2022).
H6	$SP \rightarrow K.Sh \rightarrow VTP$	It has not yet been investigated in the prior literature (Theoretical Gap)

2.10.7 Empirical Studies of Virtual Leadership, Knowledge Sharing, and Virtual Team Performance

Previous empirical research highlights the relationship between virtual leadership knowledge sharing and virtual teams' performance. It focuses on hypothesis H7, which postulates that knowledge sharing mediates the relationship between virtual teams' performance and virtual leadership. The two main relationships are shown in the table: As evidenced by the numerous research that is provided, H2 shows a direct correlation between virtual leadership and knowledge sharing, and H3 shows a direct correlation between knowledge sharing and the effectiveness of virtual teams, which is also confirmed by the studies that are cited. Nevertheless, H7, which suggests that information sharing mediates the relationship between virtual leadership and the performance of virtual teams, has not been examined in the literature to far, pointing

to a knowledge vacuum that needs to be filled. Table 2.24 demonstrates previous empirical research highlights the relationship between virtual leadership knowledge sharing, and virtual teams' performance.

Table 2.24 Prior Empirical Studies of VL and VTP, K.Sh

H7: The relationship between virtual leadership and virtual teams' performance is mediated by knowledge sharing.		
VL → K.Sh → VTP		
No	Relationship	Sources
H2	$VL \rightarrow K.Sh$	(Khatoon <i>et al.</i> , 2022); (Singh <i>et al.</i> , 2021); (Yin <i>et al.</i> , 2023); (Anis <i>et al.</i> , 2021); (Martela, 2020).
H3	$K.Sh \rightarrow VTP$	(Natu & Aparicio, 2022); (Majzoub, <i>et al.</i> , 2020a); (Al Kaabi <i>et al.</i> , 2022); (Chung <i>et al.</i> , 2022); (Swart <i>et al.</i> , 2022).
H7	$VL \rightarrow K.Sh \rightarrow VTP$	It has not yet been investigated in the prior literature (Theoretical Gap)

2.10.8 Empirical Studies of Social Presence Practices, Media Richness, and Virtual Team Performance

With an emphasis on hypothesis H8, which contends that media richness moderates the relationship between social presence practices and virtual team performance. There is one main relationship shown in Table 2.25: supported by a number of mentioned studies, H4 shows a direct correlation between social presence practices and virtual team performance. There is a theoretical gap that needs to be filled in because H8, which suggests that media richness has a moderating effect on the relationship between social presence practices and virtual team performance, has not been examined in the literature so far. Table 2.25 shows previous empirical research examining the relationship between social presence practices (trust, relation building, cohesion, and communication) and virtual team performance.

Table 2.25 Prior Empirical Studies of SP Practices, VTP, and MR

H8: The relationship between social presence practices and virtual team performance is moderated by media richness		
SP → VTP Moderated by MR		
No	Relationship	Sources
H4	$SP \rightarrow VTP$	(Tan <i>et al.</i> , 2019); (Lin <i>et al.</i> , 2008); (Aarthi & Sujatha, 2022); (Turesky <i>et al.</i> , 2020); (Ben Sedrine <i>et al.</i> , 2020); (Zaharie, 2021); (Kashive <i>et al.</i> , 2022); (Sagar <i>et al.</i> , 2023); (Yun <i>et al.</i> , 2020); (AlMarar <i>et al.</i> , 2021); (Jafari, 2021); (Holle, 2021); (Ben Sedrine <i>et al.</i> , 2020); (Chaudhary <i>et al.</i> , 2022); (Ghanbari, 2022); (Sinz, 2020); (AlMarar <i>et al.</i> , 2021); (Miaohui <i>et al.</i> , 2022); (Halim <i>et al.</i> , 2021); (Semvua <i>et al.</i> , 2024); (Arifin <i>et al.</i> , 2022).
H8	$SP \rightarrow VTP$ Moderated by MR	It has not yet been investigated in the prior literature (Theoretical Gap)

2.10.9 Empirical Studies of Virtual Leadership, Media Richness, and Virtual Team Performance

With an emphasis on hypothesis H9, which contends that media richness moderates the relationship between virtual leadership and virtual team performance. There is one main relationship shown in Table 2.26: H5, which is backed by a number of mentioned studies, shows a clear correlation between virtual team effectiveness and virtual leadership. There is a knowledge vacuum that needs to be filled since H9, which suggests that media richness has a moderating effect on the relationship between virtual leadership and virtual team performance, has not been examined in the research that has already been published. Table 2.26 shows previous empirical research evaluating the relationship between virtual leadership and virtual team performance.

Table 2.26 Prior Empirical Studies of VL, VTP, and MR

H9: The relationship between virtual leadership and virtual team performance is moderated by media richness		
VL → VTP Moderated by MR		
No	Relationship	Sources
H5	$VL \rightarrow VTP$	(Ab Wahab <i>et al.</i> , 2023); (Kashive <i>et al.</i> , 2022); (Elyousfi <i>et al.</i> , 2021a); (Zhang <i>et al.</i> , 2022); (Zaw, 2022)
H9	$VL \rightarrow VTP$ Moderated by MR	It has not yet been investigated in the prior literature (Theoretical Gap)

2.11 KNOWLEDGE GAP AND RESEARCH CONTRIBUTION

One of the crucial things that can be benefited from reviewing the previous literature is to find the knowledge gap that previous studies overlooked or did not fully cover. Previous studies indicate that there are several types of knowledge gaps, including the theoretical gap, the conceptual gap, the sector gap, the time gap, the geographical gap, and the methodology gap. In the following, the study explains the knowledge gap in each of these types and the knowledge contribution of the current study in bridging this gap.

2.11.1 Theoretical Gap

In general, empirical studies seek to increase understanding and interpretation of the phenomenon under study by employing, developing, or integrating relevant theories to give a better explanation of the phenomenon. According to Watanuki and De Oliveira Moraes (2016), future research should revisit the theory outlined thus far in an effort to find any potential correlations or mediating/moderating variables that may be lacking. The model's explained variance (R^2) values, which were particularly low for the group processes, might be improved by these additional investigations (Watanuki & De Oliveira Moraes, 2016).

Overall, there are nine research questions in the current study that suggest 9 hypotheses. There are 5 hypotheses that have been empirically tested before through previous studies, namely the first, second, third, fourth, fifth, and sixth hypotheses (H1, H2, H3, H4, H5, H6), as shown in the figure below in blue color. However, there are four research questions that represent 4 hypotheses that have not been tested before, namely the sixth, seventh, eighth, and ninth questions that represent 4 hypotheses (H6, H7, H8, H9), as shown in the figure below in red color. Thus, there is a theoretical gap in the prior studies that will be filled through the current study. (An empirical review of previous studies was carried out and the knowledge gaps at the theoretical level were stated in the previous section 2.10). The following Figure 2.8 shows the nine hypotheses of the current study, and it shows that there are 5 hypotheses that were previously tested, shown in blue color, and 4 hypotheses that

were not tested before, shown in red color. Figure 2.8 shows theoretical gaps in the prior literature and the research contribution of the current study.

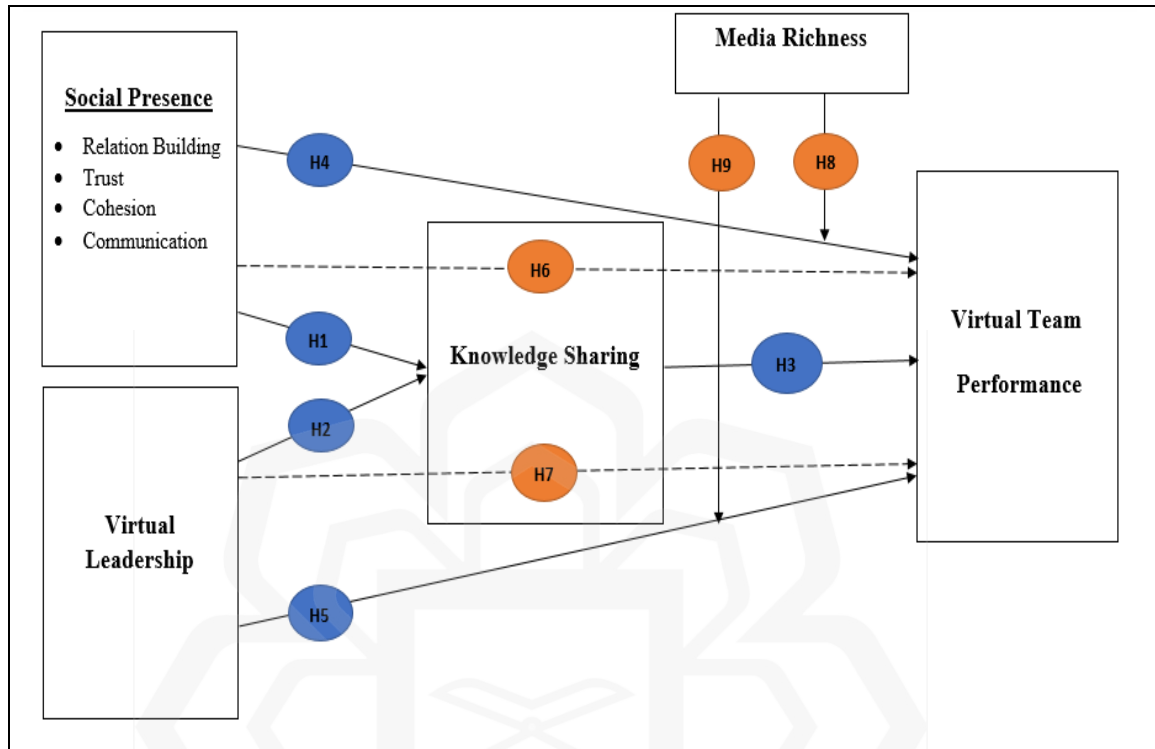


Figure 2.8 Conceptual Framework in the Current Study

Theoretically, there are four theories applied to explain the nine relationships proposed in the model of the current study, which is, by name, SPT theory to explain the relationships proposed in the first, fourth, and sixth hypotheses (H1, H4, H6). SLT theory to explain the relationships proposed in the second, fifth, and seventh hypotheses (H2, H5, and H7). SET theory to explain the relationships proposed in the third hypothesis (H3), and finally the MRT theory to explain the eighth and ninth hypotheses (H8, H9). Therefore, the current study is considered a new theoretical contribution in integrating a group of theories to better explain the performance of virtual teams.

In addition to the above, the current study is considered a new theoretical contribution by presenting a new vision for the SPT theory. Four dimensions of social

presence were tested: relationship building, trust, cohesion, and communication. While previous studies were limited to testing the relationship of these dimensions separately with the performance of virtual teams.

2.11.2 Geographical Gap

Most studies and statistics indicate that there is a clear lack of studies on the performance of virtual teams in the Asian region, especially in Malaysia. Researchers mentioned that additional research on virtual teams in other nations is required because there are clear cultural differences between Asia, Europe, and America, and various perceptions of virtual teams could affect the results (Tan *et al.*, 2019; González-Anta *et al.*, 2021; Davidaviciene *et al.*, 2020; Paul *et al.*, 2016; Elyousfi *et al.*, 2021).

When new situations arise, there is a need to re-evaluate the factors that influence virtual team performance (Wickramasinghe & Nandula, 2015; Gordon 2017). Most of the previous studies revolve around multinational companies, as the virtual teams are distributed geographically between countries, but this situation has now changed in light of COVID-19, as most local and regional companies have turned to virtual space (Azlan *et al.*, 2020), hence, in light of the new situation, there is a need to re-evaluate the factors that affect the virtual team's performance in local context in Malaysia

Figure 2.9 shows the publication distribution of virtual teams' performance on the Scopus database on 19/1/2023 (research has been done in the article title only). The results of the research show that there are only 59 articles published on the performance of virtual teams from 1996 to 2022. Published in the United States of which 29 by 49%, and in China 6 published articles with a rate of 10%. While the articles published in Malaysia, Brazil, Canada, and Taiwan were only 4 published articles each, with a rate of only 6%. While the publication in the rest of the countries was less than three articles.

It can also be seen that most of the publications about the performance of virtual teams in Western countries, for example, the United States, Canada, France, New Zealand, and the Netherlands are close to about 72.88 % of the publications. While the rest of the publications were distributed to other countries. Publishing in Asian countries such as Malaysia, Taiwan, India, and China still suffers from a shortage in this field and needs more studies and research on the performance of virtual teams in these countries.

In general, it can be said that the number of scientific publications about the performance of virtual teams is still in its infancy and is not sufficient. Especially since these publications in Malaysia are very few, not exceeding 4 articles over the year, from 1996 to 2022. Figure 2.9 shows the publication distribution of virtual teams' performance on the Scopus database on 19/1/2023.

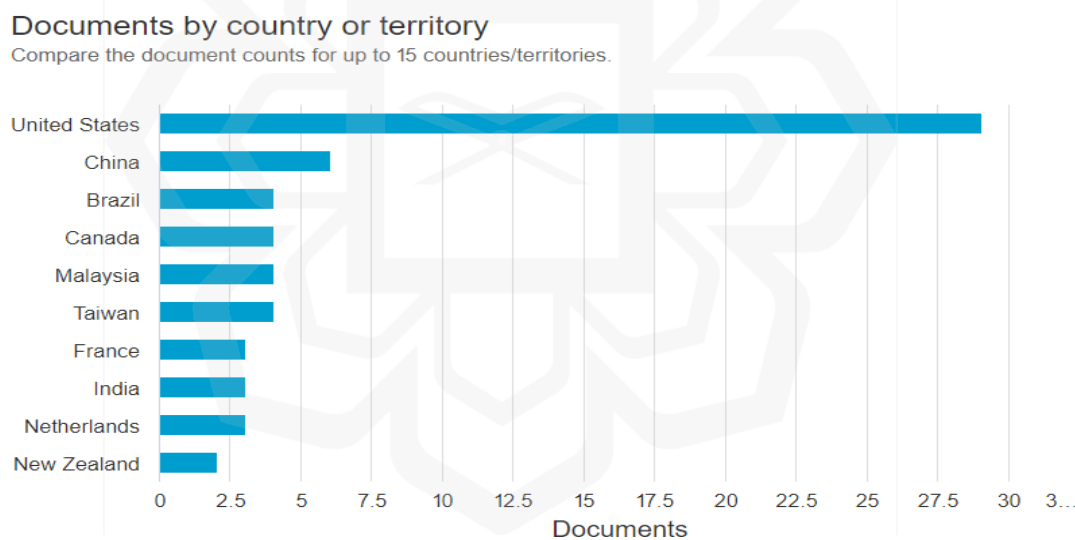


Figure 2.9 Distribution of Publications on the VTP by Country
Source: Scopus database on (19/1/2023)

This study is an actual contribution to strengthening recent studies that address the factors affecting the performance of virtual teams in the higher education sector in Malaysia. Where this study is considered an actual involvement to bridge the gap in the geographical gap around the performance of virtual teams in the Asian region, especially in Malaysia. Given that most of the local organizations in Malaysia have

begun to perform their work and provide their services via the internet (Azlan *et al.*, 2020), there is a need to study factors that support virtual teams increase their capabilities to deal with the new work environment and obtain continuous guidance, especially in the initial period of starting virtual work.

2.11.3 Contextual Gap

A review of previous studies indicates that there is a significant gap in the studies related to the performance of virtual teams in the higher education sector. The studies conducted on virtual teams in other sectors such as communications, health care, and agriculture cannot be relied upon due to the different characteristics of the virtual team according to the sector, accordingly, it can be said that there is a need to study the nature of the virtual teams in the higher education sector and the factors affecting them by employing the scientific theories associated with them (Sagar *et al.*, 2022; Tan *et al.*, 2019; Soon & Salamzadeh, 2020). A recent study might be conducted by including a few additional sectors (Bhat *et al.*, 2017; Davidaviciene *et al.*, 2020; Soon & Salamzadeh, 2020; Batarseh *et al.*, 2017).

Publication database statistics indicate a noticeable gap in previous studies on the performance of virtual teams in the education sector. Through the research conducted on the Scopus database for the year 2023 on the performance of virtual teams (research has been done in the article title only), it was found that the computer science sector is the largest sector, with a percentage of 23.8%. Followed by the business sector by 20%, then the engineering sector by 15.2%, then the social sciences sector by 10.5%. While the studies are distributed to the rest of the sectors.

Figure 2.10 shows that the percentage of studies on the performance of virtual teams in the social sciences sector does not exceed 10.5%, and if we consider that the education sector is one of the social sciences, then the education sector's share of studies will be less than 10.5%.

Documents by subject area

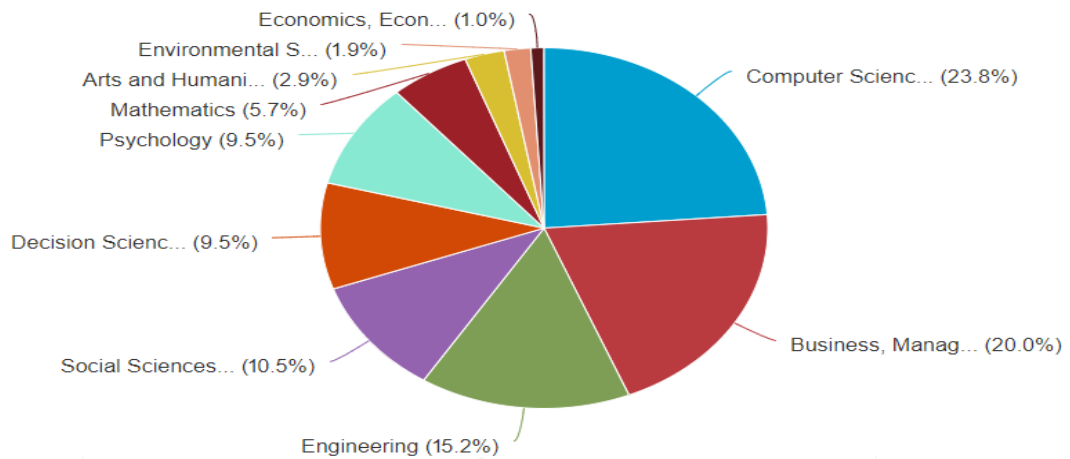


Figure 2.10 Distribution of Publications on the VTP by Sector
Source: Scopus database on (19/1/2023)

Bartsch *et al.* (2020) study shows another evidence of the lack of previous studies on the performance of virtual teams in the higher education sector as a services sector, especially in light of crises. Table 2.27 shows previous studies in the services sector distributed according to the virtual and traditional work environment, as well as according to normal conditions and during crises.

Table 2.27 Matrix of Research on Virtual Teams in the Services Context

	Non-Crisis Situation	Crisis
Non-virtual Work Environment	(Humphreys, 2002) (Battilana <i>et al.</i> , 2010) (Wieseke <i>et al.</i> , 2011) (Benlian, 2014) (Myrden and Kelloway, 2015) (Popli and Rizvi, 2015) (Lindblom <i>et al.</i> , 2016) (Herhausen <i>et al.</i> , 2017) (Guerrero <i>et al.</i> , 2018)	(Stoker <i>et al.</i> , 2019)
Virtual Work Environment	(Schepers <i>et al.</i> , 2011) (Mihhailova <i>et al.</i> , 2011) (Muganda and Pillay, 2013) (Mihhailova, 2017)	???

Source: Developed by the researcher depending on (Bartsch *et al.*, 2020) study

Accordingly, the present study is a necessary contribution to bridge the gap in previous studies on the performance of virtual teams in the higher education sector in Malaysia.

2.11.4 Temporal Gap

Previous studies indicate a time gap in studies about the performance of virtual teams. A literature review of previous research on virtual teams shows that there is a distinct lack of studies on virtual, especially during the crisis of COVID-19 (during 2020 and beyond). Therefore, it was necessary to conduct more studies on the role of virtual teams and virtual leadership work in light of crises (Bartsch *et al.*, 2020).

Scopus database statistics indicate fluctuations in studies on the performance of virtual teams' performance during the years from 1996 to 2022. In the current study, a search was conducted on the Scopus database during the last 26 years for studies that dealt with the performance of virtual teams (research has been done in the article title only). The results of the research showed that there are a few studies that do not exceed 59 articles, and it was also found that there is a fluctuation in the number of these studies, it reached its highest point in 2012 with 8 publications, then it decreased until 2017 when there were no publications in this year.

The results of the research show that studies on the performance of virtual teams returned to increasing with the beginning of the spread of COVID-19, but in general, the number is still small and did not exceed 7 publications in the past year 2022. Figure 2.11 shows the distribution of publications on the virtual team performance by year on the Scopus database on (19/1/2023).

Documents by year

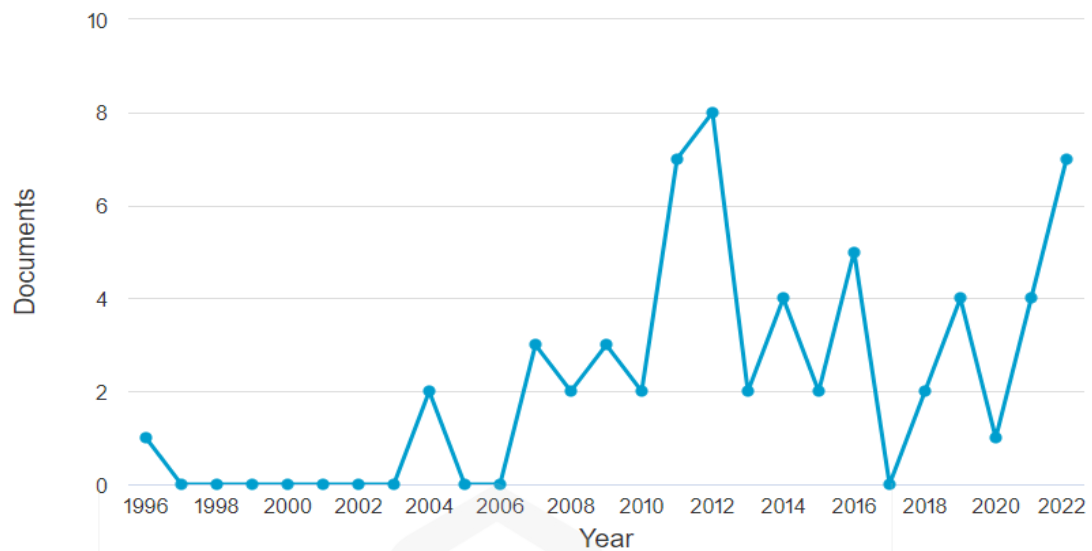


Figure 2.11 Publications on the Virtual Team Performance by Year
Source: Scopus database on (19/1/2023)

Based on the foregoing, the current study is considered an essential contribution to bridging the gap in previous studies on the performance of virtual teams, which are still few and variable during the last 26 years.

2.11.5 Methodological Gap

In general, there are more qualitative studies on the performance of virtual teams than quantitative studies. By evaluating previous research, it was discovered that conceptual studies on the performance of virtual teams are more comprehensive than empirical studies. Researchers have stated that qualitative research is more numerous than quantitative research (Tan *et al.*, 2019; Lippert & Dulewicz, 2018; Wei *et al.*, 2018; Ben Sedrine *et al.*, 2020).

A number of researchers suggested conducting more quantitative research on the performance of virtual teams. According to Gordon (2017), several researchers such as (Gilson *et al.*, 2015; Malhotra *et al.*, 2007; Mukherjee *et al.*, 2012; Abarca *et*

al., 2020; Jahagirdar & Bankar, 2020) recommended more empirical studies of virtual teams in order to understand the complex nature of virtual team interactions.

The current study is considered a new contribution to enrich the quantitative research regarding the performance of virtual teams in the higher education sector in Malaysia and comes in response to the calls of previous researchers to conduct more empirical research on the performance of virtual teams.

2.11.6 Population Gap

Previous studies on the performance of virtual teams indicate that there are no studies on virtual employees in the higher education sector in Malaysia. A review of previous studies on the performance of virtual teams indicates that the study population in the higher education sector considers students as a unit of analysis and not employees. This indicates that previous studies discuss teams' performance of virtual teams from an educational perspective, not from an administrative perspective related to the functions of the VHRD.

There are several examples of studies on the performance of virtual teams in the higher education sector that considered students in universities as the study population, such as the study of (Paul *et al.*, 2016; Schenkel & Garrison, 2009; Glikson & Erez, 2020; Chen *et al.*, 2006; Fuller & Summers, 2017; Cheng *et al.*, 2021; Robert & You, 2018; Yoon & Leem, 2021; Randazzo-Davis & Nelson, 2020; Zaharie, 2021b).

Table 2.28 shows previous studies conducted on the performance of virtual teams in the higher education sector in different countries. Where the Table 2.28 shows that in all these studies the study population was university students, which indicates that most of the previous studies examine the performance of virtual teams as an educational problem related to education and not an administrative problem related to human resources.

Table 2.28 Previous Studies on VTP by Study Population

No	Authors	Country	Sector	Population
1	(Chen <i>et al.</i> , 2006)	Taiwan	Higher education	students
2	(Schenkel & Garrison, 2009)	USA, South Korea, and UAE	Higher education	students
3	(Paul <i>et al.</i> , 2016)	USA and India	Higher education	students
4	(Fuller & Summers, 2017)	USA	Higher education	students
5	(Robert & You, 2018)	USA	Higher education	students
6	(Glikson & Erez, 2020)	Austria, China, France, Italy, Palestine, Spain and USA	Higher education	students
7	(Randazzo-Davis & Nelson, 2020)	40 Countries	Higher education	students
8	(Cheng <i>et al.</i> , 2021)	China	Higher education	students
9	(Yoon & Leem, 2021)	Korea	Higher education	students
10	(Zaharie, 2021b)	Romania	Higher education	students

Source: Developed by the researcher

The current study is a necessary contribution to bridging the gap in previous studies that did not address the performance of virtual teams working in the administrative departments of HEIs in Malaysia. Where the study population will be the administrative staff working in the higher education sector in Malaysia and performing their work during COVID-19 period virtually using cyberspace.

2.12 CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

2.12.1 Background of Study Model

In this study, a conceptual model was developed for the study variables based on several quantitative and qualitative research, as follows:

This study has adopted the conceptual framework based on recent studies such as the study of Tan *et al.* (2019) that examined the effect of six factors (trust, cohesion, relationship building, communication, reward, and coordination) on (the

performance of the virtual team). This study concluded that the factors that affect virtual team performance are only four factors, namely (trust, cohesion, relationship building, and communication), hence, these variables have been included in the current study model and the current study considered them as dimensions of social presence. While reward and coordination were excluded because they do not affect the virtual team performance.

Virtual leadership is an extremely critical factor in a virtual team environment. Tan *et al.* (2019) have suggested that future research could investigate whether there are other factors such as leadership that can impact virtual team performance. Additionally, some studies have indicated the importance of virtual leadership in enhancing the performance of virtual teams, and recommend that this factor should be tested in terms of the effect of virtual leadership on the performance of virtual teams quantitatively (Bhat *et al.*, 2017; Gordon 2017; Tan *et al.*, 2019; Han *et al.*, 2020). Therefore, this study was in response to this call by including the virtual leadership in the study model

Moreover, media richness is another factor that previous studies have shown is significant in the virtual team environment and has not been adequately studied. Media richness element is a crucial and essential factor among the members of the virtual team (González-Anta *et al.*, 2021). Therefore, media richness is one of the variables included in the current study model. Previous studies indicated that future studies should consider other variables such as the communication technologies utilized by the virtual teams in an attempt to identify any potentially missing relationships or mediating/moderating variables (Watanuki *et al.*, 2016; Wei *et al.*, 2018; Presbitero, 2019; Mysirlaki & Paraskeva, 2020). Hence, the current study is a response to these calls.

In addition, some prior studies suggest investigating knowledge sharing in the context of virtual teams. For instance, Davidaviciene *et al.* (2020) argue that future research may consider other elements, such as knowledge sharing that impact team effectiveness. Knowledge sharing has been shown to be a crucial component of team performance and is necessary for a GVT to succeed (Majzoub *et al.*, 2020; Swart *et*

al., 2022; Al Kaabi *et al.*, 2022). This suggests that knowledge sharing may have a major impact on whether virtual teams perform successfully or unsuccessfully (Al Kaabi *et al.*, 2022). Hence, knowledge sharing is also one of the variables included in the current study model that has not been sufficiently studied previously in studies related to the performance of virtual teams.

The current study developed a model to explain the effect of social presence, represented by the four factors (trust, cohesion, relationship building, and communication) on knowledge sharing (H1) and virtual team performance (H4). In addition to examining the impact of virtual leadership on knowledge sharing (H2) and virtual team performance (H5). It also tests the effect of knowledge sharing on virtual team performance (H3). In addition, the current study will test knowledge sharing as a mediator between social presence and virtual team performance (H6) and between virtual leadership and virtual team performance (H7). Finally, the study will test the effect of media richness as a moderator between social presence and virtual team performance (H8) and between virtual leadership and virtual team performance (H9).

Figure 2.12 shows the current study model that was adopted from the Tan *et al.* (2019) study, and then developed by including three new variables on it, which are by name, virtual leadership, knowledge sharing, and media richness.

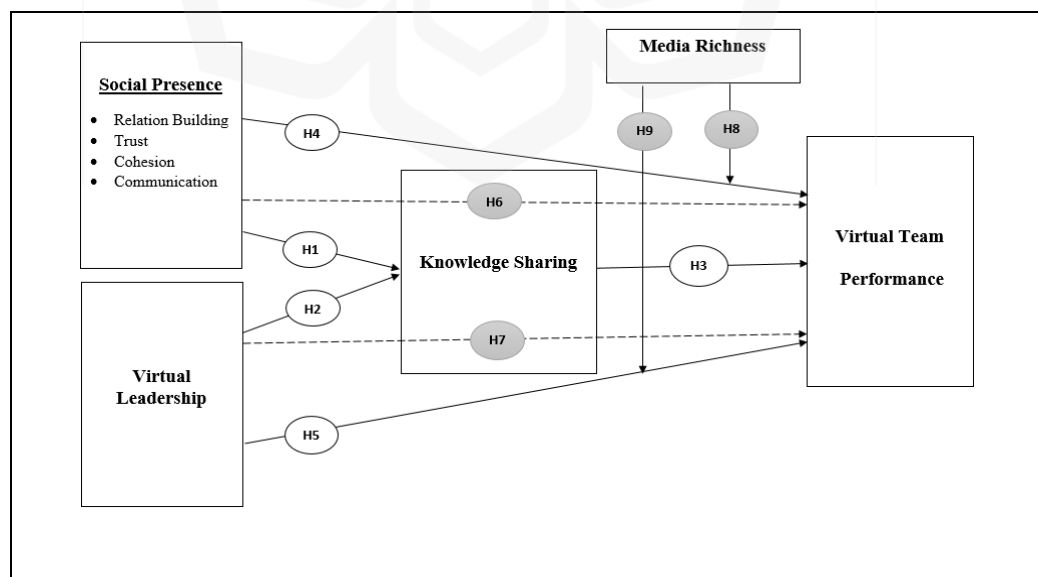


Figure 2.12 Conceptual Framework of the Present Study
Source: developed by researcher

The variables adopted in this study are considered practices of VHRD department. Researchers consider VHRD as a subset of VHR, and they consider virtual teams as one of the practices of VHRD (Bennett & Bierema, 2010). Bennett and Bierema (2010) mentioned that virtual teams performance improvement, social-professional networking, career mentoring by leaders, knowledge sharing, and action technologies are considered virtual human resource development practices. Therefore, this study adopts these practices as the main dimensions of the study model. In particular, the current study involves in its model four main components; virtual team performance, virtual leadership, knowledge sharing, and social presence with its most common components: communication, cohesion, building relationships and trust, and finally the richness of the media used in the virtual team environment.

This study moreover derived its variables from Clark *et al.* (2019) study that reviewed articles on factors affecting virtual teams, this study reviewed previous research on factors affecting the performance of the virtual team by reviewing the literature that analyzed 135 articles from peer-reviewed English journals. The study of Clark *et al.* (2019) concluded that: first, it turns out that four of five factors relate to people's social aspects, their mental and emotional states, and the connections between them affect team performance. Therefore, the focus should be on the personal and social aspects of the team, which include the relationships between team members, cohesion, trust, and leadership factors.

Finally, the current study additionally derived its variables from the results of the systematic literature review related to the factors affecting virtual teams. Sénquiz-Díaz and Ortiz-Sot (2019) found that the areas that were most researched in virtual teams from 2008 to 2018 are communication, trust, communication technology, leadership, and knowledge management. This study has adopted these variables, which are communication, trust, leadership, knowledge sharing, and the richness of the adopted means of communication.

2.12.2 Social Presence Components and Knowledge Sharing

According to the SPT theory, employees behave and perceive other people in mediated environments as though they were in person. Social presence is important when it comes to knowledge sharing because it helps with communication, relationship development, trust-building, and team cohesion. In turn, these elements have a favourable impact on people's readiness for knowledge sharing in a group or organizational context.

A relationship between social presence and knowledge sharing has been identified in several empirical studies. For example, research by Catyanadika and Rajasekera (2022) found that there was a positive and significant relationship between social presence and knowledge sharing in the higher education sector. Moreover, the study's findings imply that social presence encourages individuals to share more information (Looode, 2021).

In detail, social presence emerges among team members in the form of relationship building, trust, cohesion, and communication (Lin *et al.*, 2008; Bickle *et al.* 2019; Ben Sedrine *et al.*, 2020; Singh *et al.*, 2021). The study will briefly review how each of them affects knowledge sharing with empirical evidence from the related prior literature.

2.12.2.1 Relation Building and Knowledge Sharing

Building relationships is considered one of the most prominent aspects of the team's social presence and greatly affects the sharing of knowledge among them. Even in mediated or virtual settings, social presence helps people to build and preserve relationships with their peers. People share important knowledge and information more readily and are more inclined to communicate reciprocally when they have a sense of belonging and connection to the group.

Empirical evidence suggests solid interpersonal ties have a good effect on knowledge-sharing habits. The exchanges can improve the development of

relationships, which can help change Knowledge Sharing conduct and social networks (Waititu & Barker, 2023). Moreover, the results of prior studies showed a positive correlation between information-sharing and the relationship-building behaviour of newcomers (Zheng *et al.*, 2021). In detail, it is determined that relationship building may address the individual Knowledge Sharing determinants of employees, including open communication, motivation, empowerment, personal innovation mastery, acceptance and integration of new technologies in the workplace, perceived ease of use, perceived usefulness, attitudes, credibility, and trust (Waititu & Barker, 2023).

2.12.2.2 Trust and Knowledge Sharing

As it entails having faith in the dependability, morality, and skill of others in a social setting, trust is a vital element of social presence. In the context of knowledge sharing, trust is essential for lowering the risk and uncertainty involved in disclosing private or important information.

Trust is one of the characteristics of social presence. Many studies have proven that trust between team members helps and facilitates the sharing of knowledge between them. For instance, employees' willingness to share personal knowledge is positively influenced by both institutional and interpersonal trust (Sabetzadeh & Chen, 2023). Moreover, the study of Kmiecik (2020) demonstrate that both vertical trust and horizontal trust are related to knowledge sharing and knowledge collecting. Another evidence provided by Masood *et al.* (2023), according to the findings, using enterprise social media encourages employees to have both affect- and cognition-based trust, which improves knowledge sharing at work.

In addition, feeling trusted is a crucial mechanism at the individual level and is favourably correlated with knowledge-sharing behaviours, especially when it comes to the sustainability and long-term viability of the organisations. Subordinates tend to develop a sense of trustworthiness and respect for superiors who are transparent in sharing important information (Almadana *et al.*, 2022). Moreover, the influence of both formal and informal information exchange is stronger when there is trust. This research emphasises how crucial it is for managers, supervisors, and coworkers to

foster a trusting environment before people feel comfortable enough to be vulnerable enough to share knowledge (Lee *et al.*, 2020).

2.12.2.3 Cohesion and Knowledge Sharing

One of sign of social presence, is the degree of coherence, support, and cooperation among group members. A common identity and feeling of purpose, along with a dedication to group objectives, define cohesive groupings. Cohesion is another aspect of social presence and has an important impact on knowledge sharing. The study of Rossignoli *et al.* (2023) demonstrates how cohesion can either increase or decrease a community of practice's capacity for knowledge exchange. According to the study of Dash and Saini (2023), two traits of social networks are team cohesion and supervisor support.

Strong ties are represented by cohesive teams, and employees who feel that their teams are cohesive are more likely to lend their knowledge to other team members even when doing so goes against their interests. Comprehending the distinct dynamics of staff cohesion in higher education settings is vital to augment learning procedures and enable faculty members to share knowledge, so ultimately propelling education forward (Birhanu & Gugssa, 2024). Moreover, if the process is properly directed by those who are aware of the potential financial benefits of information sharing, group cohesion can improve the transfer of knowledge (Wojciechowska-Dzięcielak, 2020) .

2.12.2.4 Communication and Knowledge Sharing

The foundation of social presence is effective communication, which allows people to express themselves, share ideas, and plan activities with others. The sharing of knowledge inside a group is facilitated by open and transparent channels, which opens up possibilities for cooperation and knowledge sharing. Communication between virtual team members is one of the manifestations of social presence and has an important impact on knowledge exchange. When there is more organisational

communication, the benefits of congruence of openness to change on knowledge sharing will be more pronounced (Koo *et al.*, 2022).

Moreover, the sharing of knowledge is increased when there is clear communication between the use of enterprise social media and trust based on cognition (Masood *et al.*, 2023). Furthermore, this study by Kim *et al.* (2021) shows that when organisational fairness and transformational leadership are guaranteed, communication plays a critical role in promoting knowledge sharing. Additionally, in Open Innovation Projects (OIPs), formal and informal communication is positively correlated with knowledge sharing (Fang *et al.*, 2024). Moreover, employees' willingness to share knowledge is positively correlated with open and honest internal communication during a crisis (Lee *et al.*, 2020).

The elements of social presence; communication, coherence, trust, and relationship building are essential for promoting knowledge exchange among administrators in Malaysian higher education institutions. A sense of belonging is fostered by strong interpersonal interactions, which increases administrators' willingness to share expertise. Trust improves open collaboration by lowering the perceived risk of disclosing sensitive or important information. Administrative team cohesion promotes a coordinated effort toward shared objectives, which enhances information transmission. Transparent information exchange is based on effective communication, both formal and informal, which promotes collaboration and enhances institutional performance as a whole. When combined, these components of social presence foster a knowledge-sharing atmosphere that is critical to the effectiveness and performance of administrative tasks. Based on the previous discussion, the first hypothesis can be derived as follows.

H1: There is a significant positive relationship between social presence practices (Relation Building, Trust, Cohesion, and Communication) and Knowledge Sharing among administrators at HEIs Malaysia.

2.12.3 Virtual Leadership and Knowledge Sharing

In the context of SLT theory, virtual leadership focuses on creating an environment conducive to knowledge sharing through the use of technology to facilitate communication, enhance trust despite geographic distance, enhance transparency, and encourage knowledge sharing among team members.

Previous literature indicates a correlation between virtual leadership and knowledge sharing among virtual team members. Prior research indicates that if given the right support and time, virtual teams could interact more successfully than traditional teams. As a result, effective virtual team management and knowledge sharing are both dependent on effective virtual team leadership (Singh *et al.*, 2021). The development of common mental models and knowledge sharing can be facilitated by leadership in virtual teams (Morrison-Smith & Ruiz, 2020).

Furthermore, the employee can change their knowledge sharing behaviour when they have empowered leadership (Khatoon *et al.*, 2022). Moreover, there were beneficial effects of dispersed and shared leadership on knowledge sharing (Yin *et al.*, 2023). Additionally, the findings of Anis *et al.* (2021) showed a favourable direct relationship between creativity, leadership, and knowledge sharing. Moreover, online knowledge sharing was found to be impacted by transformational, transactional, and creative leadership, with creative leadership having the largest impact (Martela, 2020).

Virtual leadership is essential for promoting information exchange among administrators in Malaysian higher education institutions (HEIs). By using technology to overcome geographic distances, virtual leadership promotes communication, trust, and transparency—all of which are essential components of efficient information sharing. When their bosses empower them and foster creativity, administrators operating under virtual leadership are more inclined to share expertise. For example, administrators are more likely to share information and insights when they see excellent virtual leadership, which improves the effectiveness of the institution as a whole. Based on the above, the second hypotheses can be derived as follows:

H2: There is a significant positive relationship between virtual leadership and knowledge sharing among administrators at HEIs Malaysia.

2.12.4 Knowledge Sharing and Virtual Team Performance

Within the framework of SET theory, the reciprocity of sharing important information among team members explains the relationship between knowledge sharing and virtual team performance. Through cooperation and creativity, this improves team cohesion, trust, and problem-solving skills, ultimately leading to improved team performance.

There are empirical evidence from previous studies indicating the relationship of knowledge sharing with the performance of the virtual team. Where the results of previous studies concluded that sharing knowledge increases the performance of the virtual team (Natu & Aparicio, 2022). Moreover, It has been demonstrated that knowledge sharing is a critical element in team performance, and is essential to the success of a GVT (Majzoub *et al.*, 2020a), this implies that the success or failure of the performance of virtual teams may be significantly influenced by knowledge sharing (Al Kaabi *et al.*, 2022).

Virtual teams appear to be more active in tasks that require knowledge sharing and exchange. Therefore, the success and efficacy of virtual teams depend on how much their members' beliefs in information sharing, communication, and collaboration grow over time (Chung *et al.*, 2022). In the virtual time context, sharing knowledge is essential for creativity, problem-solving, and decision-making, making it essential for success (Swart *et al.*, 2022), Consequently, lack of information sharing has a negative effect on virtual teams (Davidavičiene *et al.*, 2020).

For administrators to succeed in virtual environments, the relationship between knowledge exchange and virtual team performance is critical in Malaysian higher education institutions (HEIs). Social exchange theory states that knowledge sharing is a two-way process in which members of a team share important information, promoting trust, team cohesion, and cooperative problem-solving. Previous studies

have shown that administrators who actively share knowledge within virtual teams improve team effectiveness and innovation. Effective knowledge sharing can help HEI administrators expedite administrative duties, enhance communication, and promote creativity in a remote environment. Additionally, strong values in communication, teamwork, and information sharing must be developed over time for virtual teams to succeed. Knowledge sharing is crucial for sustaining high performance in virtual teams within HEIs because it can have a detrimental impact on team cohesiveness and efficiency if it is impeded. Hence, the third hypothesis can be derived as follows:

H3: There is a significant positive relationship between knowledge sharing and virtual teams' performance among administrators at HEIs Malaysia.

2.12.5 Social Presence Components and Virtual Team Performance

SPT theory provides a framework for improving the VHRD, virtual teams (Bickle *et al.*, 2019). Social factors have a key role in virtual teams. Social factors such as building relationships, trust, cohesion, and communication are among the main components of social factors that have a role in team performance and virtual team satisfaction (Lin *et al.*, 2008; Bickle *et al.*, 2019; Ben Sedrine *et al.*, 2020; Singh *et al.*, 2021).

SPT theory has been applied in virtual teams by many researchers. Bickle *et al.* (2019) have stated that, in the global human resource development environment, there is a need to provide an appropriate social environment to facilitate communication, build trust, improve team cohesion, and increase a sense of belonging, respect, satisfaction, and a sense of community. In a virtual environment, developing social presence and collaboration capabilities is critical to enhancing the identity of the virtual team, and this requires establishing a robust computer-based communication model. Bickle *et al.* (2019) additionally have concluded that increasing the social presence enhances communication and interaction.

Based on the study model derived from the study of Tan *et al.* (2019) and Lin *et al.* (2008), building relationships, cohesion, trust, and communication between members of the virtual team are among the most important manifestations of social presence, the following explains the relationship between these practices and the performance of the virtual team:

2.12.5.1 Relationship Building and Virtual Team Performance

One of the social presence components that correlate with virtual team performance is the building relationships factor among virtual teams. The personal interaction between the employees is considered an essential issue when the internet is a tool to communicate between the virtual team members, it is a massive challenge when there is a lack of personal interaction. Thus, building relationships within virtual teams may be an alternative for F2F interaction (Tan *et al.*, 2019).

Relationship building is directly related to the performance of the virtual team. For instance, the findings of the study Tan *et al.* (2019) showed that relationship building and team performance are significantly and favourably correlated. Moreover, relationship building influences performance indirectly through coordination (Lin *et al.*, 2008). Additionally, the findings of the other study showed that relationship building and team performance are significantly and favourably correlated (Aarthi & Sujatha, 2022). In the context of higher education, it is expected that building relationships between members of the virtual team will correlate with the performance of the virtual team, like other sectors such as IT and the industry in which this relationship has been proven.

2.12.5.2 Cohesion and Virtual Team Performance

The cohesion factor appears in the literature review as one of the elements of social presence that correlates with virtual team performance. Researchers and practitioners have both shown a keen interest in the relationship between team cohesion and team performance (Mukherjee & Arora, 2020). Through a comprehensive review of

relevant literature, the results of Sagar *et al.* (2022) showed that team cohesion is one of the challenges in arranging virtual teams.

The relationship between cohesion and virtual team performance has been tested in several empirical recent studies. For instance, according to Ben Sedrine *et al.* (2020), the results proved that a high level of cohesion leads to an increase in team performance, and cohesion is one of the variables most related to the components of virtual team effectiveness, which are team performance and team satisfaction. Moreover, the study of Chaudhary *et al.* (2022) which applied the meta-analysis demonstrates that cohesion has a major impact on virtual team performance. Moreover, in teacher teams, team cohesion had a direct, favourable, and significant impact on learning and performance. Furthermore, there was a noteworthy and affirmative indirect impact of team cohesion via team learning on the performance of teacher teams (Ghanbari, 2022). Additionally, the analysis's findings support the notion that team cohesion and performance are positively correlated (Sinz, 2020). Furthermore, group Integration-Task was found to be a powerful predictor of team performance, and the results indicated a significant association between cohesion and performance (Holle, 2021). In the context of higher education, it is expected that cohesion between members of the virtual team will correlate with the performance of the virtual team, like other sectors such as IT and the industry in which this relationship has been proven.

2.12.5.3 Trust and Virtual Team Performance

Trust is one of the most influencing factors on the performance of teams that has been proven in previous literature, and it is considered one of the social factors in the virtual team. According to Turesky *et al.* (2020); Sergey *et al.* (2020) and Breuer *et al.* (2020), the most frequently used word in the context of virtual teams is trust. Moreover, Turesky *et al.* (2020) identified 124 articles that discussed concepts of trust in virtual teams. Because members of a virtual team who trust their peers are more inclined to take risks in order to improve the team's performance, trust is essential (Breuer *et al.*, 2020).

One of the crucial elements connected to the effectiveness of virtual teams that was covered in earlier research is the trust between team members. For instance, Turesky *et al.* (2020) have mentioned that a high level of trust-related directly with foundational of virtual teams' performance. Additionally, the study results of Ben Sedrine *et al.* (2020), indicated that trust positively impacts team performance and is one of its key elements. Moreover, the results indicated that e-trust impacts team performance (Kashive *et al.*, 2022). Furthermore, The level of trust among team members has a big impact on the performance of the team (Sagar *et al.*, 2023). Moreover, the findings showed that the model could statistically predict the association between virtual team performance and organisational trust (AlMarar *et al.*, 2021). In the higher education sector, studies have shown that trust is associated with the performance of the virtual team such as the study of Zaharie (2021) and the study of Yun *et al.* (2020) which confirms that the impact of task team trust on team performance is significant. Moreover, the findings of the Jafari (2021) study demonstrates that, among virtual student teams at Radboud University, team trust is a major predictor of virtual team performance and, eventually, favourably influences team performance.

2.12.5.4 Communication and Virtual Team Performance

Communication is the vital medium in which virtual teams are created. Communication in a virtual team environment is considered a crucial factor since virtual workers perform their jobs across geographically dispersed locations. According to Davidaviciene *et al.* (2020), F2F communication is no longer the preferred method of communication due to its high cost. ICT has changed the ways teams share, collect, and share information between them. Davidaviciene *et al.* (2020) additionally explained that advances in ICT have created a need for virtual teams to bring in global expertise and talent. Reliance on ICT has become important for communication between team members and thus has become a major factor affecting the performance of the virtual team (Aleem, 2021).

Previous studies indicate that effective communication between team members contributed to an improvement in the performance of virtual teams. For instance, the findings showed that there is a significant correlation between communication and virtual team performance (AlMarar *et al.*, 2021). Moreover, the findings showed a strong and favourable correlation between team performance and communication (Halim *et al.*, 2021). Furthermore, the study found that employee performance in commercial banks is influenced by team communication (Semvua *et al.*, 2024). Additionally, the study's conclusions demonstrate that effective virtual team communication can enhance performance in the field of environmental management (Arifin *et al.*, 2022). In the education context, it is found that the frequency of communication significantly improves team performance (Miaohui *et al.*, 2022). Communication between members of the virtual team is predicted to correlate with the success of the virtual team in the context of higher education, as it has been shown in other sectors such as information technology, and manufacturers.

The elements of social presence; communication, coherence, trust, and relationship building are crucial for improving administrators' effectiveness in virtual teams at Malaysian higher education institutions (HEIs). Building relationships promotes a sense of belonging and human connections, both of which are essential for collaboration in online settings when in-person contacts are scarce. Strong ties increase the likelihood that administrators will coordinate well, which enhances team performance. Numerous studies have demonstrated that when administrators collaborate to achieve shared objectives, team cohesion improves overall performance and increases satisfaction.

To overcome the dangers and uncertainties that come with virtual teamwork, trust is essential. It also motivates administrators to take action and provide insightful information that improves team performance. Last but not least, communication is the foundation of virtual teams, guaranteeing that information is freely shared among geographically separated members to improve decision-making and problem-solving. For administrators in virtual teams to complete duties quickly and sustain high productivity, effective communication is crucial. Like their equivalents in other industries like IT, these social presence components work together to foster an

environment where administrators can flourish and improve the effectiveness of virtual teams in HEIs. Based on the foregoing, the fourth hypothesis can be derived as follows:

H4: There is a significant positive relationship between social presence practices (Relation building, Trust, Cohesion, and Communication) and virtual team performance among administrators at HEIs Malaysia.

2.12.6 Virtual Leadership and Virtual Team Performance

According to SLT theory, the situational virtual leader style is suitable for a virtual environment, because leaders need to change their leadership style to be successful in a virtual environment (Clark, 2019). Virtual employees are affected by distance, social and emotional factors, trust, motivation, and adversity of conflict, moreover, virtual employees need different qualifications and capabilities than traditional employees (Morrison-Smith & Ruiz, 2020). When moving to a virtual environment, employees can be exposed to more technological challenges and team collaboration. Here, the virtual leader uses the situational approach to overcome these challenges (Morrison-Smith & Ruiz, 2020). Prior literature have agreed that effective leadership plays a critical role in the success of virtual teams (Eseryel *et al.*, 2020; Efimov *et al.*, 2020; Seftyandra, 2020; Turesky *et al.*, 2020; Zeuge *et al.*, 2020). Virtual leadership in virtual teams plays a key role in the efficiency of the team as well as it is considered the big five contributors to the efficiency of the team (Ben Sedrine *et al.*, 2020). The virtual team leader is the role model and works to ensure the quality of results and their achievement within the time available (Bekirogullari & Thambusamy, 2020).

Virtual team leadership has been shown to dramatically increase team performance. Specifically, effective communication among virtual leaders via virtual platforms has an impact on team performance. This suggests that current leaders must possess up-to-date knowledge of digital communication (Ab Wahab *et al.*, 2023). Moreover, e-leadership has an impact on the virtual team's performance as a unit (Kashive *et al.*, 2022). Furthermore, virtual team performance is significantly

impacted by perceived e-leadership, which encompasses a leader's behaviours, communication/coordination, and trustworthiness (Elyousfi *et al.*, 2021a). Additionally, the findings of the study show that virtual team performance can be positively impacted by real leadership (Zhang *et al.*, 2022). Moreover, the enhancement of staff performance is a result of the leaders' virtual leadership methods. The results of this study confirmed the significance of virtual leadership techniques for worker performance and work engagement (Zaw, 2022).

The relationship between virtual leadership and virtual team performance has been proven in many previous studies and in different sectors, and therefore there may be a possible relationship in the higher education sector as well.

Virtual leadership is essential to improving the effectiveness of administrators' virtual teams in Malaysian higher education institutions (HEIs). According to Situational Leadership Theory (SLT), virtual leaders in HEIs need to modify their approach to leadership to meet the demands of a virtual setting. These difficulties include motivation, trust-building, technology hurdles, and geographic distance; to preserve team productivity, leaders must modify their strategies. Despite being geographically separated, virtual leaders play a crucial role in ensuring that administrators collaborate and perform well thanks to their coordination, communication, and trust-building skills.

By fostering an organized, encouraging, and supportive environment, virtual leadership helps HEI administrators operate better. Better team interactions can be facilitated by leaders with digital communication abilities, guaranteeing that projects are finished effectively and on schedule. Additionally, virtual leadership provides direction and support, which is essential for administrators overseeing remote teams, helping them overcome obstacles like technological difficulties. Prior research in a variety of fields has shown that virtual leadership and team performance are positively correlated, suggesting that the higher education sector would likely see comparable associations. By encouraging trust, maintaining open lines of communication, and offering the assistance required to navigate the challenges of remote work settings,

virtual leaders in HEIs can improve performance. Based on the foregoing, the fifth hypothesis can be derived as follows:

H5: There is a significant positive relationship between virtual leadership and virtual team performance among administrators at HEIs Malaysia.

2.12.7 Social Presence, Knowledge Sharing, and Virtual Team Performance

According to prior literature, it has been discussed that social presence practices (relation building, trust, cohesion, communication) have a relationship with knowledge sharing **H1**. In detail, the prior literature indicated that relation building correlates to knowledge sharing (Zheng *et al.*, 2021; Waititu and Barker, 2023). And trust correlates to knowledge sharing (Sabetzadeh and Chen, 2023; Kmiecik, 2020; Masood *et al.*, 2023; Almadana, *et al.*, 2022; Lee *et al.*, 2020). And cohesion correlates to knowledge sharing (Rossignoli *et al.*, 2023; Birhanu And Gugssa, 2024; Wojciechowska-Dzięcielak, 2020). And communication cohesion correlates to knowledge sharing (Koo *et al.*, 2022; Masood *et al.*, 2023; Kim *et al.*, 2021; Fang *et al.*, 2024; Lee *et al.*, 2020).

On the other hand, previous literature indicated that knowledge sharing impacts virtual team performance **H3**. For instance, the study of Natu and Aparicio (2022); Majzoub *et al.* (2020); Al Kaabi *et al.* (2022); Chumg *et al.* (2022); and Swart *et al.* (2022) conclude that knowledge sharing increases the performance of the virtual team. According to the SPT theory, social presence fosters relationship development, communication, and a sense of connection among team members, all of which improve knowledge sharing. In turn, sharing knowledge makes it easier to collaborate and solve problems, which eventually boosts the effectiveness of virtual teams.

The relationship between social presence, knowledge sharing, and virtual team performance is crucial for improving the effectiveness of virtual teams among administrators at Malaysian higher education institutions (HEIs). Social presence, which encompasses communication, cohesiveness, trust, and relationship development, fosters an atmosphere that is favorable for administrators to share

knowledge effectively. Strong social relationships in a virtual environment help administrators feel connected, which promotes candid communication and teamwork, according to Social Presence Theory (SPT). For example, administrators are more inclined to share critical knowledge when they establish good connections and trust with their teams, which enhances communication and problem-solving skills.

The performance of virtual teams has been demonstrated to be positively impacted by knowledge sharing. Effective knowledge sharing among administrators leads to improved decision-making, creativity, and problem-solving, all of which improve team performance. This relationship suggests that social presence practices and virtual team performance are mediated by information sharing. To coordinate complicated administrative activities, virtual teams in HEIs rely significantly on knowledge sharing. The smooth and effective transmission of knowledge is ensured by the existence of strong social variables like communication and trust. As a result, administrators who feel that their teams are highly socially present are more likely to share knowledge, which eventually improves the effectiveness of virtual teams. Hence, knowledge sharing might mediate the relationship between social presence and virtual teams' performance, and hypothesis 6 can be derived as the following:

H6: The relationship between social presence practices and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia.

2.12.8 Virtual Leadership, Knowledge Sharing, and Virtual Team Performance

According to prior literature, it has been discussed that virtual leadership has a relationship with knowledge sharing **H2**. In particular, the prior literature indicated that virtual leadership correlates to knowledge sharing (Khatoon *et al.*, 2022; Singh *et al.*, 2021; Yin *et al.*, 2023; Anis *et al.*, 2021; Martela, 2020). On the other hand, prior research has shown that knowledge sharing affects the performance of virtual teams **H3**. In detail, it has been confirmed that knowledge sharing improves the performance of the virtual team, according to studies by (Natu and Aparicio, 2022; Majzoub *et al.*,

2020; Al Kaabi *et al.*, 2022; Chung *et al.*, 2022; Swart *et al.*, 2022). Therefore, knowledge sharing might play a mediating role in the relationship between virtual leadership and the performance of virtual teams. In light of SLT theory, the situational leader focuses on adaptable leadership techniques that promote cooperation and communication even in the face of physical distance. Cohesion, trust, and collective efficacy are all enhanced by competent virtual leaders, who create open channels for information exchange among team members. These factors all lead to better performance in virtual teams.

Virtual leadership is essential for encouraging knowledge exchange in Malaysian higher education institutions (HEIs), which improves the effectiveness of administrators' virtual teams. Effective virtual leaders modify their leadership approaches to meet the particular difficulties of virtual environments, like physical distance and technology obstacles, by previous research and the tenets of Situational Leadership Theory (SLT). Virtual leaders foster an atmosphere that is favorable to information sharing by promoting open communication, fostering trust, and strengthening team cohesion. Administrators are more likely to share important information and insights—which are essential for problem-solving and decision-making—when virtual leaders empower their teams by promoting openness, cooperation, and support.

According to earlier studies, knowledge sharing greatly enhances virtual teams' performance. Active information sharing among administrators improves task coordination, problem-solving, and innovation, which boosts output and team effectiveness. Thus, the relationship between virtual team performance and virtual leadership is mediated by information sharing. The development and performance of virtual teams in HEIs are strongly impacted by the role that virtual leaders play in creating an atmosphere where administrators can openly exchange expertise. Through the mechanism of knowledge sharing, virtual leadership indirectly improves team performance by promoting communication and collaboration. Accordingly, the seventh hypothesis in the current study can be derived as follows:

H7: The relationship between virtual leadership and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia.

2.12.9 Social Presence, Media Richness, and Virtual Team Performance

MRT theory posits that utilizing richer mediums enhances virtual team performance, especially for tasks with ambiguity, achieved by aligning media properties with task requirements (Zuofa & Ochieng, 2021). Employing rich media fosters the formation of bonds and relationships among team members.

Media richness is a commonly used factor in literature review regarding virtual team performance. Media richness has powerful effects, such as educational effectiveness (Abarca *et al.*, 2020). According to prior literature, it has been discussed that media richness has a relationship with virtual team performance. MRT theory argues that virtual team performance is enhanced when a richer medium is used, especially for ambiguous tasks by matching media properties with the required tasks (Zuofa & Ochieng, 2021). Media richness is important to enhancing virtual team performance, when the media supports the users to transmit rich information then the communication will be effective (Liao *et al.*, 2020). Media richness and type of technology, together with the quality of technology, is enhancing team efficiency and effectiveness (Hyvönen & Utoslahti, 2021).

On the other hand, previous studies indicate that social presence practices (relation building, trust, cohesion, communication) between team members contributed to an improvement in the performance of virtual teams **H4**. In detail, it has been confirmed that relationship building affects virtual team performance (Tan *et al.*, 2019; Lin *et al.*, 2008; Aarthi and Sujatha, 2022). And trust affects virtual team performance (Turesky *et al.*, 2020; Ben Sedrine *et al.*, 2020; Zaharie, 2021; Kashive *et al.*, 2022; Sagar *et al.*, 2023; Yun *et al.* 2020; AlMarar *et al.*, 2021; Jafari, 2021). And cohesion affects virtual team performance (Holle, 2021; Ben Sedrine *et al.*, 2020; Chaudhary *et al.*, 2022; Ghanbari, 2022; Sinz, 2020). And communication affects

virtual team performance (AlMarar *et al.*, 2021; Miaohui *et al.*, 2022.; Halim *et al.*, 2021; Semvua *et al.*, 2024; Arifin *et al.*, 2022).

Hence, the interaction between social presence practices and media richness might occur. There are two scenarios for the effect of social presence on the performance of the virtual team. The first is when the level of media richness of the means of communication used among members of the virtual team is high, and the second is when it is low:

- When the level of media richness of the means of communication between team members is high, this may increase the social presence of team members and thus increase the performance of the virtual team. According to Marques-Quinteiro *et al.* (2022), virtual teams will differ in their outcomes just as much as they differ in the communication media they employ. For example, the higher the degree of synchronisation and media richness of the communications medium, the more successful the communication.
- Conversely, when the level of media richness of means of communication between team members is low, this may decrease the social presence of team members and thus decrease the performance of the virtual team. For instance, Team reflexivity is likely to have a negative impact on improving team performance if the virtual environment does not offer as rich media to show cues as F2F situations (Marques-Quinteiro *et al.*, 2022). Moreover, MRT theory specifically states that poor communication media richness will have a detrimental effect on performance in virtual teaming (Kanse *et al.*, 2023).

The connection between social presence, media richness, and virtual team performance is essential for improving administrative efficiency in Malaysian higher education institutions (HEIs). The use of rich media (such as video conferencing) enhances the effectiveness of social presence behaviors, which are essential for enhancing virtual team dynamics. These practices include relationship development,

trust, cohesion, and communication. Richer communication tools, according to Media Richness Theory (MRT), offer better interaction and feedback, which strengthens social ties and encourages team members to work together, improving performance. On the other hand, employing low-richness media can erode these aspects of social presence, which will decrease team performance. Rich communication technologies are therefore necessary for the best results in virtual teams, as media richness moderates the beneficial influence of social presence on virtual team performance. sharing. Based on the prior discussion, the eighth hypothesis **H8** can be derived as follows:

H8: The relationship between social presence practices and virtual team performance is moderated by media richness among administrators at HEIs Malaysia.

2.12.10 Virtual Leadership, Media Richness, and Virtual Team Performance

Previous research has highlighted the media richness in the context of virtual work environment. According to MRT theory, using a richer medium improves virtual team performance, particularly for tasks that are unclear since the features of the media are matched with the tasks that are needed to complete (Zuofa & Ochieng, 2021). The effectiveness of virtual teams can be improved by media richness since it facilitates the transmission of rich information by users (Liao *et al.*, 2020). On the other hand, It has been discovered that virtual team leadership significantly improves the performance of teams (Ab Wahab *et al.*, 2023; Kashive *et al.*, 2022; Elyousfi *et al.*, 2021; Zaw, 2022). Hence, this effect might differ according to the level of media richness.

There are two scenarios for the effect of virtual team leadership on the performance of the virtual team. The first is when the level of media richness of the means of communication used among members of the virtual team is high, and the second is when it is low:

- When the level of media richness of the means of communication between team members is high, this may increase the effect of virtual team

leadership on the performance of the virtual team. For instance, in fact, MRT theory argues that a leader's power to influence the team through verbal and nonverbal signals would increase with the media richer (Ben Sedrine *et al.*, 2020) .

- Conversely, when the level of media richness of means of communication between team members is low, this may decrease the effect of virtual team leadership on the performance of the virtual team. For instance, Insufficient media richness makes it difficult for the transformative leader to foster cooperation (Ben Sedrine *et al.*, 2020).

The relationship between virtual leadership, media richness, and virtual team performance is crucial for improving administrative operations in virtual settings in Malaysian higher education institutions (HEIs). Although virtual leadership is essential for leading teams, the degree of media richness employed in communication can have a big impact on how effective it is. Richer communication methods, like video conferencing, enable more nuanced and transparent interactions through both verbal and non-verbal cues, which can increase the leader's impact on the team, according to Media Richness Theory (MRT).

A high level of media richness allows virtual leaders to communicate more effectively, which improves team cohesiveness, collaboration, and trust—all of which improve team performance. On the other hand, a leader's capacity to inspire and engage the team may be weakened in situations where media richness is minimal (such as text-based communication), which would impair teamwork and performance. The association between virtual leadership and virtual team performance is thus moderated by media richness, underscoring the significance of employing suitable communication methods to optimize the influence of leadership on virtual teams in HEIs. Hence, the interaction between virtual leadership and media richness might occur, and therefore the ninth hypothesis **H9** can be derived as follows:

H9: The relationship between virtual leadership and virtual team performance is moderated by media richness among administrators at HEIs Malaysia.

Table 2.29 shows a summary of the study hypotheses based on the conceptual framework of the study:

Table 2.29 Summary of the Study Hypotheses

<i>The First Hypothesis</i>	<i>H1:</i> <i>There is a significant positive relationship between social presence and knowledge sharing among administrators at HEIs Malaysia.</i>
<i>The Second Hypothesis</i>	<i>H2:</i> <i>There is a significant positive relationship between virtual leadership and knowledge sharing among administrators at HEIs Malaysia.</i>
<i>The Third Hypothesis</i>	<i>H3:</i> <i>There is a significant positive relationship between knowledge sharing and virtual teams' performance among administrators at HEIs Malaysia.</i>
<i>The Fourth Hypothesis</i>	<i>H4:</i> <i>There is a significant positive relationship between social presence and virtual teams' performance among administrators at HEIs Malaysia.</i>
<i>The Fifth Hypothesis</i>	<i>H5:</i> <i>There is a significant positive relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia.</i>
<i>The Sixth Hypothesis</i>	<i>H6:</i> <i>The relationship between social presence and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia.</i>
<i>The Seventh Hypothesis</i>	<i>H7:</i> <i>The relationship between virtual leadership and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia.</i>
<i>The Eighth Hypothesis</i>	<i>H8:</i> <i>The relationship between social presence practices and virtual team performance is moderated by media richness among administrators at HEIs Malaysia.</i>
<i>The Ninth Hypothesis</i>	<i>H9:</i> <i>The relationship between virtual leadership and virtual team performance is moderated by media richness among administrators at HEIs Malaysia.</i>

2.13 CHAPTER SUMMARY

Reviewing the previous literature on the topic of research is especially important to build the theoretical basis for the study, in addition to identifying the scientific gap that forms the basic pillar of any scientific research. Based on the foregoing, this study has discussed in the second chapter the theoretical and empirical studies related to the virtual environment in the field of human resource development. Especially the factors

affecting the performance of virtual teams. Then, the conceptual framework of the study was defined, and hypotheses were developed that evaluate the relationships between the study variables.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter illustrates the research philosophy and research methodology in this study which includes several stages such as; research philosophy, research paradigm, the approach of the theory development, research design including (methodological choice, research strategies, time horizon, data collection, type of investigation, and purpose of research), sampling process including (population of the study, sample frame, sampling design, sample size, unit of analysis, and sampling procedure), research instrument including (research instrument design, research instrument validity, pilot study, and research instrument reliability), and chapter summary.

3.2 RESEARCH PHILOSOPHY

A system of beliefs and presumptions regarding the advancement of knowledge is referred to as research philosophy. The research philosophy will guide the selection of the appropriate research design for the study. Research philosophy indicates some sort of assumptions related to the development of knowledge and the nature of that knowledge (Saunders *et al.*, 2009). To truly understand social reality, especially the desired subject of research, it primarily deals with core ideas on specific issues (Burke, 2007). As a result, it is clear how a research project should be carried out to produce reliable and accurate results. In a more straightforward fashion, research philosophy would form the basis of the research paradigm, and relevant research methodologies would then be selected in accordance.

Ontology and epistemology are the two main philosophies that underpin inquiry. Since ontology is concerned with the nature of reality, it raises problems about how people understand the world and the phenomena they wish to explore. Either a fixed (one) absolute truth or numerous (many) truths will be adopted by researchers

(Bechara & Van de Ven, 2011; McKenna & Richardson, 2016). This ultimately gave rise to the two branches of subjectivism and objectivism. While the latter assigns a specific meaning to every action or behavior witnessed by interpreting through emotions and attitudes (internal), the former primarily focuses on observable facts (external) without the researcher's personal perception (Saunders *et al.*, 2019).

Because it influences the following processes, including epistemology, methodology, and methods, ontology is crucial (Johnston, 2014; McKenna & Richardson, 2016). On the other hand, epistemology relates to the nature of the accepted knowledge, which then raises the question of what the truth would be and how to obtain it through inquiry. Researchers must choose whether they wish to interact with the study's subject directly or from a distance to accomplish this.

3.3 RESEARCH PARADIGM

A paradigm is the fundamental framework for a belief. A perspective that one uses to perceive the world. Paradigm refers to belief, assumption, and tradition, it means a network of coherent ideas (Bassey, 2012). A research paradigm describes a strategy for looking at certain social phenomena to gain understanding and knowledge (Saunders *et al.*, 2019). A research paradigm is a group of assumptions and ideas that are widely shared within a research community. Such a paradigm is a type of mental model that shapes and directs how researchers view their respective fields of study.

The concept of positivism in research, which emerged in natural science, might be interpreted as an approach where observable facts are defined and findings are quantifiable (Burke, 2007). In this position, the researcher serves as an instrument that is encouraged to be free from personal bias. Contrary to positivism, Interpretivism (also known as anti-positivism) fervently holds that the universe is socially produced and susceptible to numerous interpretations (Johnston, 2014). Additionally, anytime data analysis is conducted, interpretivists favor explanations that are comprehensive, rich, and sympathetic. It is therefore not a value-free strategy and does entail the researcher's subjective assessment.

According to Zhao *et al.* (2008), Auguste Comte (1798-1857) was considered to be the founder of sociology, who combined the method of rationalism and the method of empiricism in a new method called positivism. The positivism philosophy, science, and scientific research are the way to reach the truth. They believe that there is an objective truth that must be sufficiently discovered to enable the phenomenon to be understood, controlled, and predicted. Zhao *et al.* (2008) have stated that the main approach for researchers to the postural approach is an experiment, whereby cause-and-effect relationships can be assessed through experimentation and observation. Reliability of observations, generalizability of conclusions, and research rigor and reproducibility are all important to positivists.

According to MacLean (2013), researchers have used this paradigm in the study of social phenomena. Since this research takes the empirical approach to accessing knowledge, it is necessary to follow logical steps to create knowledge. Saunders *et al.* (2019) have explained that the research philosophy promises positivism with unambiguous and accurate knowledge and focuses on the rigorous scientific experimental method designed to produce pure data and facts unaffected by human interpretation or bias.

In the current research, the positivism research paradigm will be adopted. It is thought that positivism would be suitable for this particular study to attain the necessary research aims. As this study aims to test the relationship that involves social presence practices (building relationships, trust, cohesion, and communication), virtual leadership, knowledge sharing, media richness, and virtual team performance, thus, positivism seems to be an appropriate adoption.

3.4 APPROACH OF THE THEORY DEVELOPMENT

The researchers use deductive reasoning to propose theories that can be tested using a fixed, predefined research design and objective measures (Sekaran & Bougie, 2016). The seven steps of the hypothetico-deductive technique are: identifying a wide problem area, defining the problem statement, hypothesising, choosing measures,

gathering data, analysing data, and interpreting the findings. A hypothesis about an interesting topic is tested using deductive reasoning according to the scientific method. Keep in mind that a theory is an orderly collection of premises that yields testable predictions. We move from the more general to the more specific in deductive reasoning. We begin with a broad theory and then focus on particular hypotheses that can be tested. When we gather certain observations to verify our hypotheses, we focus even more. Finally, analysis of these particular observations enables us to confirm (or deny) our initial theory (Saunders *et al.*, 2019).

This study will adopt the deductive approach to develop the theories adopted in this study in order to test the hypotheses. Considering that this approach is in line with the positivist school of thinking that was adopted in this study. Figure 3.1 shows the difference between the inductive approach and the deductive approach.

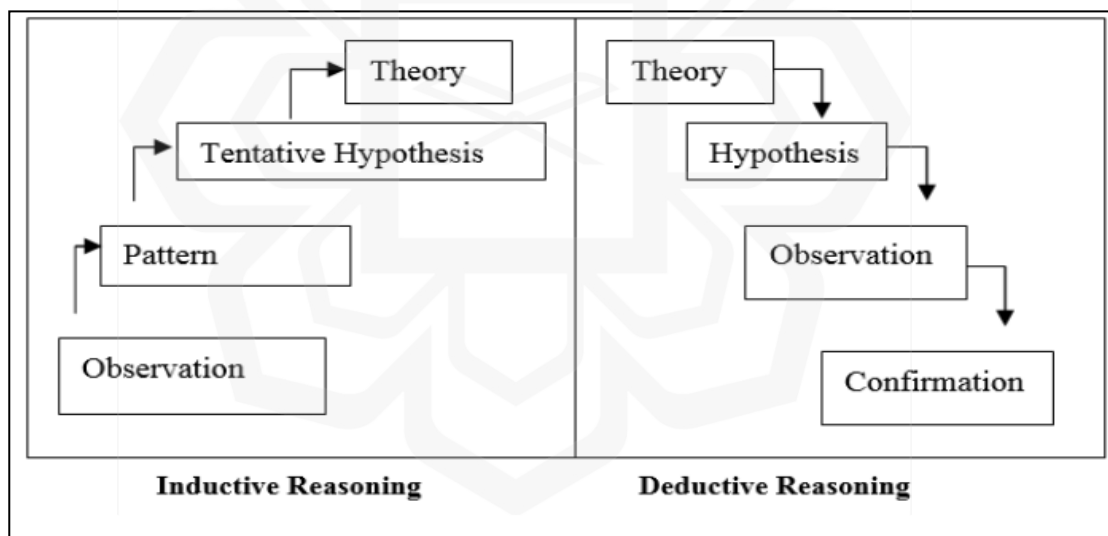


Figure 3.1 Difference between Inductive and Deductive Approaches.

Source: Aliyu *et al*; 2015

3.5 RESEARCH DESIGN

The general approach that researchers select to integrate the many study components in a logical and cogent manner, assuring that they will effectively solve the research challenge, is known as research design. In other words, research design is the

framework of research methods and techniques chosen by a researcher. The design allows researchers to focus on research methods that are suitable for the subject matter and set up their studies to achieve the overall objective. To ensure that research is accurate and unquestioned, a research framework requires careful design and selection of appropriate research methods.

The research design process includes several steps, including the following: methodological choice (quantitative, qualitative, mix-methods); research strategies (experiment or quasi-experiment, survey, archival or documentary research, case study, ethnography, action research, and ground theory); time horizon (cross-sectional, longitudinal); and data collection; type of investigation (causal, correlational); purpose of research (exploratory, descriptive, explanatory, and evaluating). The following shows the steps of the research design in this study.

3.5.1 Methodological Choice

The current study adopts the quantitative research methodology, where this type of methodology fits with the positivist philosophy of thinking and with the deductive approach to developing theories. According to Zikmund *et al.* (2010), quantitative data represent phenomena by assigning numbers in an orderly and meaningful way. This research is characterized by the fact that it reaches research samples faster, compared to qualitative research (Dawson, 2002 ; MacLean, 2013). By large-scale survey research, employing techniques like questionnaires or organized interviews, quantitative research creates statistics. Compared to qualitative research, this sort of method has a much wider audience (Dawson, 2002).

3.5.2 Research Strategies

A strategy is a plan for conducting a specific objective. We can achieve research goal(s) and respond to the study's research questions with the use of a research plan. As a result, the decision to use a particular research strategy will be based on the study's research objectives and the type of research questions, as well as a personal

philosophy of what constitutes high-quality research and relevant practical considerations like availability of data sources and time constraints (Sekaran & Bougie, 2016).

The research strategies design is directly dependent on research questions and research objectives, considering research philosophy, research approach, and theory development approach. To pursue questions and research objectives the common study design should be chosen such as; experiment or quasi-experiment, survey, archival or documentary research, case study, ethnography, action research, and ground theory.

The survey will be adopted in this study as a method of data collection, as the survey is the most common type of data collection in quantitative research when the type of data to be collected about the study population is primary data. The first step in the quantitative research approach is to develop a measurement tool. By following the quantitative research methodology, statistics can be generated through survey research using methods such as questionnaires. The type of questionnaire that is most popular is the closed-ended type. In quantitative research, this type of questionnaire is used to produce statistics (Dawson, 2002).

A survey is a method of gathering data from or about individuals to describe, contrast, or otherwise explain their knowledge, attitudes, and behavior (Fink, 2003). Because it enables the researcher to get quantitative and qualitative data on a variety of research questions, the survey technique is highly well-liked in the field of business research (Sekaran & Bougie, 2016).

In this study, the researcher has adopted the survey tool from previous studies where the study variables were derived from prior studies (Choi *et al.*, 2008; Lin *et al.* 2008; Wickramasinghe & Nandula 2015; Wei *et al.*, 2018; Lin *et al.*, 2019; Dennis & Kinney, 1998; Jafari, 2021; Pangil & Chan, 2014). The research variables included in the model are; social presence (trust, cohesion, relationship building, and communication), virtual leadership, knowledge sharing, media richness, and virtual team performance. The survey tool was subjected to content validation investigation

by academics and experts in this field. Furthermore, a pilot test was conducted to test the reliability of the study instrument.

3.5.3 Time Horizon

There are two common types of time horizons in scientific research. A cross-sectional and longitudinal study. In the cross-sectional study, data is collected for a research problem only once (a day, a few days, and a few months). It is mainly used for surveys, but it also applies to the qualitative method as well as the mixed method (Sekaran & Bougie, 2016; Zikmund *et al.*, 2010). In a longitudinal study, data is collected multiple times, to fully address the research issue, the researcher may wish to examine individuals or phenomena across the course of multiple periods. Cross-sectional studies are less expensive and require less time and effort than longitudinal investigations (Sekaran & Bougie, 2016). In the current study, cross-sectional method has been adopted since the data will be collected only once. In addition, given the considerations of time, cost, and effort that are usually required by longitudinal data, cross-sectional studies are more suitable for the current study.

3.5.4 Data Collection

In the survey questionnaire, the participants were asked to complete the questionnaire, and the participants were encouraged to participate and express their opinions, it emphasized that the information is confidential and used for scientific purposes only. This study relies on a printed questionnaire. It was also used in the current study to collect data from the available and accessible study sample. Data were collected by distributing questionnaires, after which the data was coded and analyzed using the appropriate statistical analysis tools. The next step, according to the quantitative research approach, is to analyze the data and test the hypotheses to make sure whether the research hypotheses are supported or not.

3.5.4 Type of Investigation

There are two categories of investigation: correlational and causal. A causal study is one in which the investigator aims to identify the root cause of an issue. However, the study is referred to as a correlational study when the researcher is interested in identifying the key variables connected to the issue (Saunders *et al.*, 2013).

To describe populations, events, or circumstances, the researcher may occasionally be interested in connections between variables. Relationships between variables are described through correlational investigations. Finding a correlation does not necessarily entail that one variable causes a change in another variable, even while correlational studies can indicate that there is a relationship between two variables (Sekaran & Bougie, 2016). A causal study is necessary when we want to establish a definitive cause-and-effect relationship. But if we want to identify all the factors contributing to the problem, then we go for a correlational study. Causal studies investigate whether one variable influences another. In a causal investigation, the researcher seeks to identify one or more contributing causes to a problem (Sekaran & Bougie, 2016).

In the current study, the causal method has been adopted, as this study aims to study the influencing factors of social presence (building relationships, cohesion, trust, and communication) and virtual leadership (independent variables) on the performance of virtual teams (dependent variable). Thus, the independent variables and the dependent variables are known. In addition, testing knowledge sharing as a mediator, and media richness as a moderator.

3.5.5 Purpose of Research

There are four types of purpose of research; exploratory, descriptive, explanatory, and evaluating. Firstly, to better understand the nature of the issue, exploratory research is first carried out because there aren't many studies done in that field. Moreover, knowledge is scant, and a deeper understanding is necessary for this kind of research. Secondly, the goal of descriptive studies is to offer to the researcher a profile or to

describe an event or situation of research interest. Thirdly, in explanatory studies, the main goal is to establish a relationship between variables. Fourthly, in evaluative studies, the main purpose is to know how well something works (Saunders *et al*, 2019). The current study adopted the explanatory study, as this study aims to establish a correlational relationship between the variables (Saunders *et al.*, 2009). Figure 3.2 shows the steps for designing scientific research for the current study.

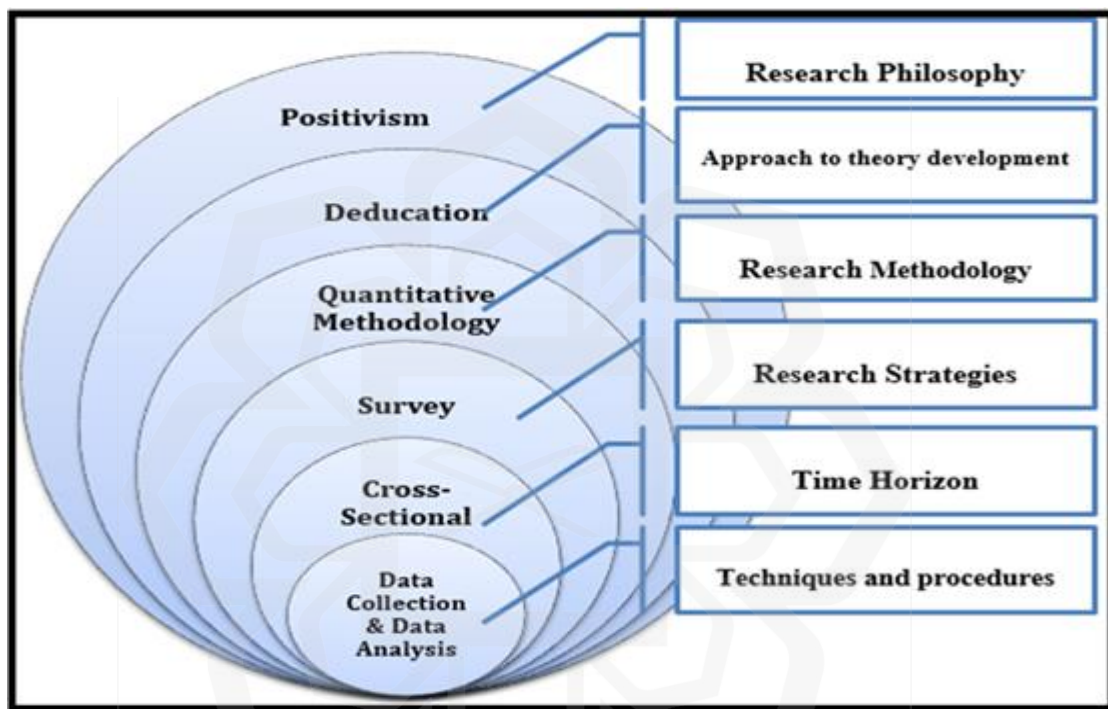


Figure 3.2 Research Design of the Current Study
Source: (Saunders *et al.*, 2019)

In sum, the research design in the current study includes the following; research philosophy is positivism and the deductive approach is adopted as the method of theory development. In addition, this study adopts the quantitative research methodology, where this type of methodology fits with the positivist philosophy of thinking and with the deductive approach to developing theories. The survey has been adopted in this study as a method of data collection, as the survey is the most common type of data collection in quantitative research. Furthermore, cross-sectional studies have been adopted since the data will be collected only once due to the considerations

of time, cost, and effort. Finally, correlational studies have been adopted, and explanatory were adopted in the study, as this study aims to establish a correlational relationship between the variables.

3.6 SAMPLING PROCESS

Sampling is a multi-stage process; its main objective is to choose a sufficient number of correct elements from the study population so that it is possible to study and understand the characteristics of this sample and generalize the results to the study population. According to Sekaran and Bougie (2013), the selection of the sample passes in the following stages: define the population, determine the sample frame, determine the sampling design, determine the appropriate sample size, unit of analysis, and execute the sampling procedure. These steps were adopted in the current study as follows.

3.6.1 Population of the Study

A population can be defined as “all people or items (unit of analysis) with the characteristics that one wishes to study” (Bhattacharjee, 2012, p.65). Additionally, the term "population" refers to the whole set of individuals, occasions, or subjects that the researcher wants to look into. According to Sekaran and Bougie (2013), the target study population should include elements, geographic boundaries, and time.

In the current study, the population sample is the employees who work in teams such as departments, divisions, offices, and units in the MHE sector who have worked virtually via the internet, either partially or completely, and experimented the performance of work remotely, during the COVID-19 period and beyond. According to MQA (2022), there are many types of HEIs in Malaysia such as; public universities, private universities, polytechnics, colleges, institutions, and university collage. Statistics issued by MQA (2022) indicate that there are 900 public and private HEIs (This number includes the branches of each university or educational institution), including foreign branches of prestigious international universities from USA, UK,

Australia, and Ireland. Table 3.1 shows institutions of higher education in Malaysia and their types:

Table 3.1 Types of HEIs in Malaysia

Types of Institutions of HEIs		Number	Source
Public /Government Institution	University	70	(MQA,2022)
	Polytechnic	36	
	College/ Institution	271	
Private Institution	University	83	
	University Collage	44	
	College/ Institution	396	
Total	-	900	

Source: developed by the researcher depending on MQA (2022)

Figure 3.3 shows the types of HEIs in Malaysia and the numbers of each according to MQA for the year 2022.

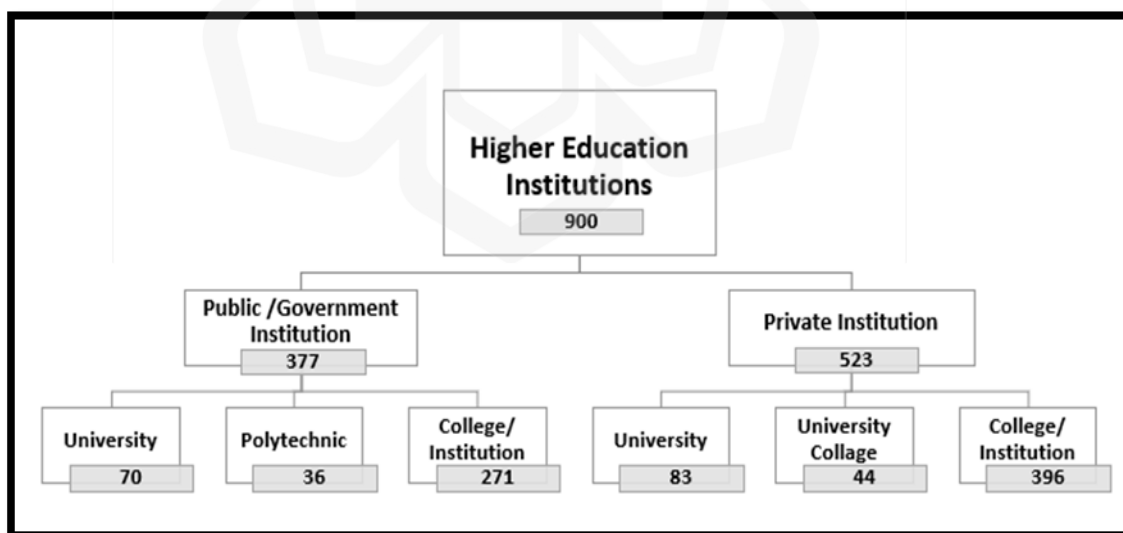


Figure 3.3 Types of HEIs in Malaysia

Source: developed by the researcher depending on (MQA, 2022)

3.6.2 Sample Frame

The sampling frame refers to a list of every component of the population that the sample is taken (Sekaran & Bougie, 2016). There is a list of Malaysian HEIs provided by MHE (2022) which includes 900 educational institutions, including foreign branches of these institutions inside Malaysia. Table 3.2 presents a list of the types and number of HEIs in Malaysia.

Table 3.2 Public Universities in Malaysia

No	Name of university	Location	Date established
1	Universiti Malaya (UM)	Kuala Lumpur	1-1-1962
2	Universiti Sains Malaysia (USM)	Penang	1969
3	Universiti Kebangsaan Malaysia (UKM)	Selangor	18-5-1970
4	Universiti Putra Malaysia (UPM)	Selangor	4-10-1971
5	Universiti Teknologi Malaysia (UTM)	Johor	1-4-1975
6	Universiti Teknologi MARA (UiTM)	Selangor	26-8-1999
7	Universiti Islam Antarabangsa Malaysia (UIAM)	Selangor	10-5-1983
8	Universiti Utara Malaysia (UUM)	Kedah	16-2-1984
9	Universiti Malaysia Sarawak (UNIMAS)	Sarawak	24-12-1992
10	Universiti Malaysia Sabah (UMS)	Sabah	24-11-1994
11	Universiti Pendidikan Sultan Idris (UPSI)	Perak	24-2-1997
12	Universiti Sains Islam Malaysia (USIM)	Negeri Sembilan	13-3-1998
13	Universiti Malaysia Terengganu (UMT)	Terengganu	15-7-1999
14	Universiti Tun Hussein Onn Malaysia (UTHM)	Johor	30-9-2000
15	Universiti Teknikal Malaysia Melaka (UTeM)	Melaka	1-12-2000
16	Universiti Malaysia Pahang (UMP)	Pahang	16-2-2002
17	Universiti Malaysia Perlis (UniMAP)	Perlis	2-5-2002
18	Sultan Zainal Abidin (UniSZA)	Terengganu	1-1-2006
19	Universiti Malaysia Kelantan (UMK)	Kelantan	14-6-2006
20	Universiti Pertahanan Nasional Malaysia, (UPNM)	Kuala Lumpur	10-11-2006

Source: Malaysian Ministry of Higher Education, 2022

Table 3.3 shows the private universities in Malaysia, the date of their establishment, and their workplace.

Table 3.3 Private Universities in Malaysia

No	Name of university	Date Established	Location
1	Multimedia University (MMU), Cyberjaya	established in 1997	Cyberjaya / Melaka / Johor
2	Universiti Tenaga Nasional (UNITEN)	established in 1999	Putrajaya / Pahang
3	Universiti Tun Abdul Razak (UniRAZAK)	established in 1999	Selangor
4	Universiti Teknologi Petronas (UTP)	established in 1999	Selangor
5	International Medical University (IMU)	established in 1999	Kuala Lumpur
6	Universiti Selangor (UNISEL)	established in 2000	Selangor (Shah Alam and Bestari Jaya)
7	Open University Malaysia (OUM)	established in 2000	Kuala Lumpur
8	Malaysia University of Science & Technology (MUST)	established in 2000	Selangor
9	AIMST University	established in 2001	Kedah
10	Universiti Tunku Abdul Rahman (UTAR)	established in 2002	Selangor / Perak
11	Universiti Kuala Lumpur (UniKL)	established in 2001	11 campuses located in Kuala Lumpur and around the country
12	Wawasan Open University	established in 2006	Penang
13	Albukhary International University	established in 2006	Kedah
14	Al-Madinah International University (MEDIU)	established in 2006	Selangor
15	International Centre for Education in Islamic Finance (INCEIF)	established in 2006	Kuala Lumpur
16	Limkokwing University of Creative Technology	upgraded to university college in 2003, and further upgraded to full university status in 2007	Putrajaya / Melaka
17	Management and Science University (MSU)	formerly KUTPM which was established in 2001 and upgraded to full university in 2007	Selangor
18	Asia e University (AeU)	established in 2007	Kuala Lumpur
19	UCSI University	upgraded to university college in 2003 and further	Kuala Lumpur / Terengganu / Sarawak

No	Name of university	Date Established	Location
		upgraded to full university status in 2008	
20	Quest International University	established in 2009	Perak
21	INTI International University (IIU)	Negeri Sembilan	upgraded to university college in 2006 and further upgraded to full university status in 2010
22	Taylor's University	Selangor	upgraded to university college in 2006 and further upgraded to full university status in 2010
23	Sunway University	Selangor	upgraded to university college in 2004 and further upgraded to full university status in 2011
24	Manipal International University	Nilai	established in 2010
25	Perdana University	Selangor	established in 2011
26	HELP University	Kuala Lumpur	upgraded to university college in 2004 and further upgraded to full university status in 2011
27	UNITAR International University	Selangor	established in 2011
28	Raffles University Iskandar (RUI)	Johor	established in 2011
29	Malaysia Institute of Supply Chain Innovation (MISI)	Selangor	established in 2011
30	Nilai University	Negeri Sembilan	upgraded in 2007 and further upgraded to full university status in 2012
31	SEGi University	Selangor	upgraded in 2008 and further upgraded to full university status in 2012
32	Asia Pacific University of Technology and Innovation (APU)	Kuala Lumpur	upgraded in 2004 and further upgraded to full university status in 2012
33	Binary University of Management and Entrepreneurship	Selangor	upgraded in 2004 and further upgraded to full university status in 2012
34	Infrastructure University Kuala Lumpur (IUKL)	Selangor	upgraded in 2003 and further upgraded to full university status in 2012
35	Asia Metropolitan University	Selangor/Johor (Two campuses: Cheras campus, Selangor and Johor)	upgraded in 2008 and further upgraded to full university status in 2012
36	Putra Business School	Selangor	established in 2012
37	Manipal GlobalNxt University	Kuala Lumpur	established in 2012
38	MAHSA University	Selangor	upgraded in 2009 and further upgraded to full university status in 2013
39	International University of Malaya-Wales	Kuala Lumpur	established in 2013

No	Name of university	Date Established	Location
40	University Malaysia of Computer Science and Engineering	Putrajaya	established in 2013
41	Universiti Islam Malaysia, Cyberjaya	Selangor	established in 2014
42	DRB-HICOM University of Automotive Malaysia	Pahang	established in 2015
43	Asia School of Business	Kuala Lumpur	established in 2015
44	Selangor	upgraded in 2010 and further upgraded to full university status in 2016	City University
45	Kuala Lumpur	established in 2016	Meritus University
46	Perak	upgraded in 2012 and further upgraded to full university status in 2016	Universiti Sultan Azlan Shah
47	Kedah	upgraded in 2006 and further upgraded to full university status in 2018	Universiti Islam Antarabangsa Sultan Abdul Halim Mu'adzam Shah
48	Selangor	established in 2005 and upgraded to full university status in 2019	Universiti Cyberjaya (University of Cyberjaya (UoC))
49	Pahang	established in 2005 and upgraded to full university status	Universiti Islam Pahang Sultan Ahmad Shah (UnIPSAS)
50	Sarawak	established in 2003 and upgraded to full university status in 2021	Universiti Teknologi Sarawak (UTS)

Source: Malaysian Ministry of Higher Education, 2022

Table 3.4 shows the private university colleges in Malaysia, the date of their establishment, and their workplace.

Table 3.4 Private University-Colleges in Malaysia

No	Name of Branch Campus	Date Established	Location in Malaysia
1	International University College of Technology Twintech (IUCTT) North Borneo University College, Sabah (formerly known as International University College of Technology Twintech, Sabah campus)	upgraded in 2013	Sabah

No	Name of Branch Campus	Date Established	Location in Malaysia
2	Kuala Lumpur Metropolitan University College (KLMUC)	upgraded in 2007	Kuala Lumpur
3	TATI University College	upgraded in 2007	Terengganu
4	Berjaya University College	established in 2007	Kuala Lumpur
5	Melaka Islamic University College	upgraded in 2009	Melaka
6	Linton University College	upgraded in 2010	Negeri Sembilan
7	UOW Malaysia KDU University College	upgraded in 2010	Selangor / Penang
8	Widad University College	upgraded in 2011	Pahang
9	KPJ Healthcare University College	upgraded in 2011	Negeri Sembilan
10	Lincoln University College	upgraded in 2011	Selangor
11	Southern University College	upgraded in 2012	Johor
12	Bestari University College	established in 2012	Terengganu
13	Veritas University College Formerly Vinayaka Mission International University College	established in 2013	Penang
14	University Technology Sarawak	established in 2013	Sarawak
15	Tunku Abdul Rahman University College	upgraded in 2013	Kuala Lumpur / Penang, Johor, Perak, Sabah, Pahang
16	Geomatika University College	upgraded in in 2013	Kuala Lumpur
17	Islamic University College of Perlis (KUIPs)	established in 2014	Perlis
18	University College Sabah Foundation (UCSF)	established in 2014	Sabah
19	Kolej Universiti Agrosains Malaysia	established in 2014	Melaka
20	Kolej Universiti Islam Pahang Sultan Ahmad Shah	established in 2015	Pahang
21	Kolej Universiti Poly-Tech MARA	upgraded in 2015	Kuala Lumpur
22	First City University College	upgraded in 2015	Selangor
23	New Era University College	upgraded in 2016	Selangor
24	Fairview University College	established in 2017	Selangor
25	International University College of Technology Twintech (IUCTT)	upgraded in 2003	Kuala Lumpur / Kelantan
26	Saito University College	upgraded in 2017	Selangor

No	Name of Branch Campus	Date Established	Location in Malaysia
27	Han Chiang University College of Communication	upgraded in 2017	Penang
28	Genovasi University College	established in 2017	Selangor
29	PICOMS International University College	upgraded in 2018	Kuala Lumpur
30	University College of Yayasan Pahang	upgraded in 2018	Pahang
31	Kolej Universiti Islam Antarabangsa Selangor (KUIS)	established in 1995 and upgraded	Selangor
32	i-CATS University College	upgraded in 2020	Sarawak
33	Netherlands Maritime University College (NMUC)	NMIT was established in 2011 and upgraded in 2021	Johor
34	Manipal University College Malaysia (MUCM)	MMMC was established in 1997 and upgraded in 2021	Melaka

Source: Malaysian Ministry of Higher Education, 2022

In Malaysia, there are ten branches of foreign universities from different countries such as the United States, the United Kingdom, Australia, and China. Table 3.5 shows branches showing the names of foreign universities in Malaysia.

Table 3.5 International Branch Campuses in Malaysia

No	Name of Branch Campus	Date established	Location in Malaysia	Country of Origin
1	Monash University Malaysia	established in 1998	Selangor	Australia
2	Curtin University, Sarawak Malaysia	established in 1999	Sarawak	Australia
3	University of Nottingham Malaysia Campus	established in 2000	Kuala Lumpur / Selangor	United Kingdom
4	Swinburne University of Technology, Sarawak Campus	established in 2004	Sarawak	Australia
5	Newcastle University Medicine Malaysia	established in 2007	Johor	United Kingdom
6	University of Southampton Malaysia Campus	established in 2011	Johor	United Kingdom

No	Name of Branch Campus	Date established	Location in Malaysia	Country of Origin
7	Heriot-Watt University Malaysia	established in 2012	Putrajaya	United Kingdom
8	University of Reading Malaysia	established in 2013	Johor	United Kingdom
9	Xiamen University Malaysia Campus	established in 2015	Selangor	China
10	Royal College of Surgeons in Ireland and University College Dublin Malaysia Campus	established in 2018	Penang	Ireland

Source: Malaysian Ministry of Higher Education, 2022

However, the sampling frame which is the employees who have worked in teams virtually in each HEIs in Malaysia is not available, hence, non-probability sampling has been adapted in this study as will be explained in the next section.

3.6.3 Sampling Design

According to Saunders *et al.* (2019), a survey is a system for collecting information from or about people to clarify their attitudes, behaviors, or knowledge. The survey strategy is extremely popular in the commercial field because it allows collection of quantitative and qualitative data on many research questions. In the business sector, opinion polls are often conducted on topics such as consumer decisions, customer satisfaction, job satisfaction, and other research topics. Usually, questions are arranged in questionnaires either on paper or on the computer. Zhao *et al.* (2008) have mentioned that sampling is a procedure of selecting several items as part of a group to conclude the study population. The purpose of using samples is to facilitate the appreciation of some characteristics of the study population.

There are two main types of sampling, namely; probability and non-probability sampling. The choice is made between probabilistic and non-probability samples depending on the time requirements, the purpose of the study, the extent of

generalization required, and the availability of data about the study (Sekaran & Bougie, 2016).

Firstly, in probability samples, each component of the sample population has a known chance or probability of selection (Dawson, 2002). There exist multiple varieties of probability sampling, including cluster, stratified, simple, and systematic random sampling. One of the most widely used probability sampling techniques is simple random sampling. In probability samples, research results can be generalized to the community. This is a popular method, but it is difficult and expensive.

Secondly, in non-probability, there are no known opportunities to take sampling from the study population, and the results of the study cannot be generalized using non-probability sampling. However, it is less complex and time-consuming than the comparison of probability samples (Saunders *et al.*, 2019). Non-probability sampling comes in a variety of forms, including quota, snowball, convenience, and purposeful sampling.

In the current study, non-probability was adopted samples due to the lack of an appropriate sample frame for the study. In this type of study sample design many of the invitations for the survey are published online or F2F, which leads to non-probability samples, but difficulties are facing the researcher when adopting this type of non-probability samples, such as the ability of researchers to generalize their results, as well as, response rates are usually low (Saunders *et al.*, 2019).

Purposive sampling has been adopted in the current study as a type of non-probability sampling, as there are criteria that potential respondents must meet (Sekaran & Bougie, 2016). Where sometimes samples are taken from a group of the sample community according to characteristics or criteria determined by the researcher to target a group of people who can provide the required information, this type of sample is called purposive sampling. Criteria of participation in the current study are: 1. Work in HEIs in Malaysia 2. Work within the team (Divisions, Offices, Departments, Units) 3. Work as administrative staff. 4. Experienced in virtual or hybrid working.

3.6.4 Sample Size

Structural Equations Modeling (SEM) has been used to test hypotheses in this study, to test eight variables, namely social presence (trust, cohesion, relationship building, and communication), virtual leadership, knowledge sharing, media richness, and virtual team performance. The sample size is an essential element to obtain appropriate results with meaningful estimates. Saunders *et al.* (2019) have reviewed some rules of Roscoe (1975) regarding sample size such as: First, for most research, sample sizes between 30 and 500 are suitable. Second, the sample size in multivariate research, which includes multiple regression analyses, should be at least ten times (if not more) the number of variables in the study.

According to Hair *et al.* (2014), there should be 5 observations for each parameter. For example, if the search form contains 40 parameters, then the ideal minimum sample size will be $n = 200$ (40×5). The statistical strength of the results may be questionable and will not be reliable if the ratio is less than 5: 1). In this study, the researcher has used 48 variables in the survey questionnaire to test the research model and 5 observations (respondents) for each variable, then the total sample size $n = 240$ (48×5). However, 373 samples were collected from the target study population, which exceeds the required sample size.

3.6.5 Unit of Analysis

The degree of data aggregation obtained during the next data analysis stage is referred to as the unit of analysis. The unit of analysis can be an individual, a group organization, or a nation whose features we want to examine (Bhattacharjee, 2012). According to the objectives of the study, which seeks to observe the relationships between the factors of social presence, virtual leadership, knowledge sharing, the richness of the media used for communication between team members and the performance of the virtual team, therefore, the unit of analysis in this study is the employees in the HEIs in Malaysia who have worked in partially or completely virtually and whether for long or short periods during and after COVID-19 period.

The study population includes administrative employees if they fulfill the conditions for participation specified by the researcher. The employee in the sample satisfied the following criteria:

- 1- They have worked in the HEIs in Malaysia, in Malaysian universities.
- 2- They have worked as administrative employees, not as academics.
- 3- They have worked virtually partially or completely Using ICT during COVID-19 and beyond.
- 4- They have worked in a team during COVID-19 and beyond.

Employees who have worked in the HEIs in Malaysia and have used virtual space to perform their work, and work within a team can answer the questionnaires for this study. Finance department employees, postgraduate department employees, IT department employees, and human resource department who have performed their duties remotely during and after COVID-19 are examples of virtual teams working in the HEIs in Malaysia. A targeted sample of employees of virtual teams in Malaysian universities will be contacted directly face to face to ensure that they have experienced remote work as virtual teams during and after COVID-19.

3.6.6 Sampling Procedure

This study follows several steps to select the sample from the target study population:

Firstly, the selection of the study population; at this stage, HEIs in Malaysia were identified as a population of the study, which are government education institutions including government universities, polytechnic, colleges, and institutions. The second type is private education institutions, including private universities, university colleges, colleges, and institutions. The final total for all types of public and private HEIs reached 900, including branches of each educational institution. The top

ten Malaysian universities according to QS ranking were selected as the current study samples.

Secondly, the next step is to set the sample frame, which is a list of the employees who have worked in teams in top-ten Malaysian universities according to QS, such as departments, divisions, offices, and units that worked remotely during or after COVID-19. However, this list was not available.

Thirdly, the third step is to design the sample. At this stage, the differences between the probability and non-probability samples are determined and the types of each are indicated. The non-probability sampling method was chosen due to the lack of a sampling frame at the level of the analysis unit which are employees who have worked in HEIs in Malaysia during and after COVID-19. Purposive sampling was adopted as a non-probability sampling method because there are criteria that participants must meet, as explained previously.

Fourthly, at this stage, methods for determining the sample size were presented according to the references related to it. Due to the lack of the size of the study population, other methods were followed to determine the appropriate sample size for the study, which reached 240 according to Hair *et al.* (2014), which indicated that the sample size is determined by the number of items of the study instruments multiplied by 5 times.

Fifthly, the unit of analysis for this study was determined according to the questions and objectives of the research, which are the employees who have worked in HEIs in Malaysia who have performed their duties and tasks via the ICTs during and after COVID-19.

Finally, in this study, data has been collected using F2F Method from top-ten Malaysian universities according to QS.

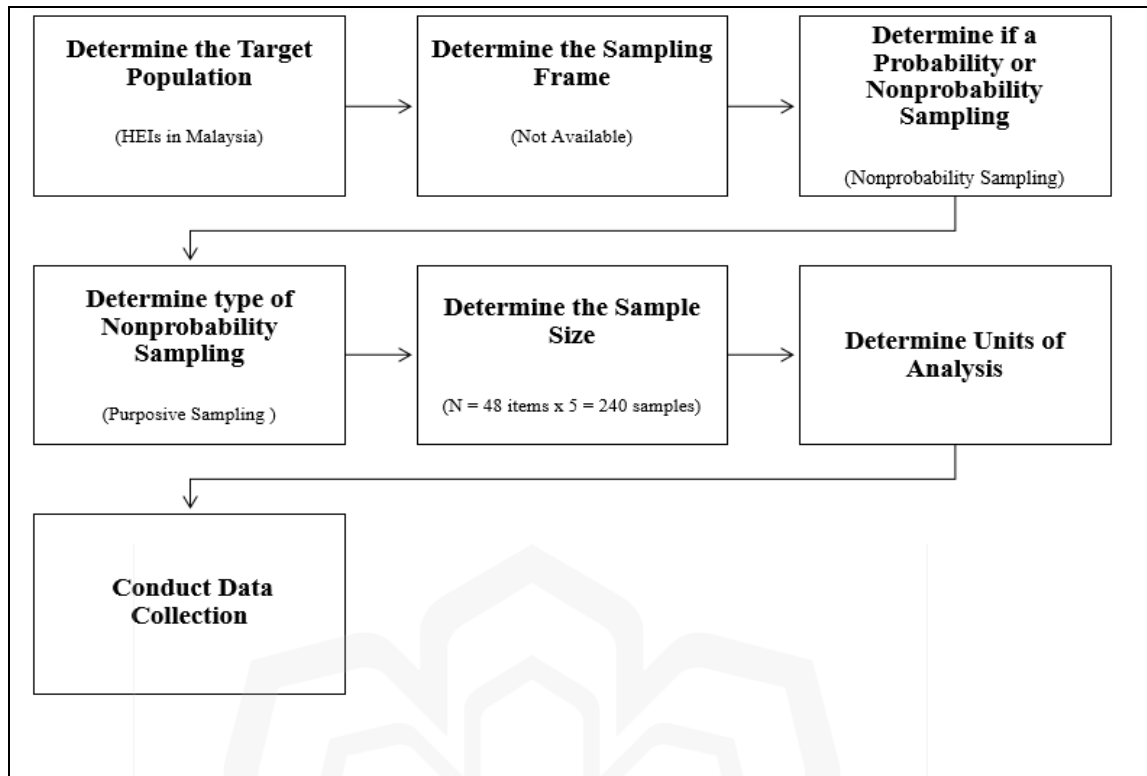


Figure 3.4 Flow of Task in Sampling Based on Sekaran and Bougie (2013)

3.7 RESEARCH INSTRUMENT

3.7.1 Research Instrument Design

The quantitative survey questionnaire has been used to collect data, especially Closed-ended questionnaires, which are the most common. This type of questionnaire is used to generate statistics in quantitative research, as these questionnaires follow a specific format, and the resulting statistics can be easily compiled (Dawson, 2002).

The research questionnaire measures eight variables, which are five independent variables (relationship building, cohesion, trust, communication, and virtual leadership), a dependent variable (virtual team performance), a moderator variable (media richness), and a mediator variable (knowledge sharing). Measures of all variables were adopted and adapted based on previous studies (Choi *et al.*, 2008; Lin *et al.*, 2008; Wickramasinghe & Nandula, 2015; Wei *et al.*, 2018; Lin *et al.*, 2019; Dennis & Kinney, 1998; Jafari, 2021; Pangil & Chan, 2014). All variables were measured using a five-point Likert scale to indicate the respondents' rating level (1:

strongly disagree, 5: strongly agree). Table 3.6 shows sources of research variables +measurement.

Table 3.6 Sources of Research Variables Measurement

Type of Variables	Name of variables		Items	Sources
Independent Variables	Social Presence Components	Trust	6 Items	(Choi <i>et al.</i> , 2008)
		Cohesion	4 Items	(Lin <i>et al.</i> , 2008)
		Relationship Building	6 Items	(Lin <i>et al.</i> , 2008)
		Communication	5 Items	(Wei <i>et al.</i> , 2018)
Independent Variable	Virtual Leadership		6 Items	(Lin <i>et al.</i> , 2019)
Dependent Variable	Virtual Team Performance		8 Items	(Wickramasinghe & Nandula, 2015) and (Jafari, 2021)
Mediating Variable	Knowledge Sharing		6 Items	(Pangil & Chan, 2014)
Moderating Variable	Media Richness		7 Items	(Dennis and Kinney, 1998)
Total of Items			48	-

Source: (Lin *et al.*, 2008; Choi *et al.*, 2008; Wickramasinghe & Nandula, 2015; Wei *et al.*, 2018; Lin *et al.*, 2019; Dennis & Kinney, 1998; Jafari, 2021; Pangil & Chan, 2014).

In particular, the study instrument was divided into two main sections. The first section contains 15 elements related to basic information variables about virtual team members namely; demographic diversity such as gender diversity, functional diversity; generational diversity; and educational diversity. Cultural diversity such as nationality diversity; linguistic diversity; religious diversity; and ethnic diversity. Team diversity such as geographical diversity; time zone diversity; methods of working during and after COVID-19; digital media diversity; experience in ICT diversity; team size; and team tenure.

The second section contains eight variables that represent the variables in research conceptual framework, namely; social presence practices: (cohesion, communication, building relationships and trust), virtual leadership, media richness,

knowledge sharing, and virtual team performance. In the following, the study presents the operational definitions of these variables and the sources of their measurement:

According to Tan *et al.* (2019, p.2071) trust is defined as “The willingness of virtual projects team members to be reliant on each other based on the expectation that each member will perform actions beneficial to the success of the team”. To evaluate trust, the study chose Choi *et al.* (2008) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes six items. An example of the items is “I believe that other team members are honest and reliable”.

Cohesion is defined as “a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuits of its instrumental objectives and/or for the satisfaction of member affective needs” (Tan *et al.*, 2019, p.2071). To measure cohesion, the study chose Lin *et al.* (2008) measuring scale in the current study. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes four items. An example of the items is “My virtual team members are a very cohesive unit”.

Lin *et al.* 2008 argued that relationship building is defined as “includes interaction processed designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust” (Tan *et al.*, 2019, p.2071). To measure relationship building, this study adopted Lin *et al.* (2008) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes six items. An example of the items is “My virtual team members rely on each other”.

According to Wei *et al.* (2018), Communication is defined as “The transition of information and understanding through the use of common symbols (verbal or nonverbal) between two or more team members in the appropriate manner” (Tan *et al.* 2019, p.2071). To measure communication, the study chose Wei *et al.* (2018) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019). The scale includes five items. An example of

the items is “When I communicate with my virtual team members, they understand my concerns”.

Moreover, virtual leadership is defined as "a process of social influence embedded in both proximal and distal AIT- mediated contexts that can change attitudes, emotions, thought, actions, and performance" (Torre & Sarti, 2020, p.4). To test virtual leadership, the study chose Lin *et al.* (2019) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019). The scale includes six items. An example of the items is “Our virtual team leader promotes learning from experience”.

Knowledge sharing has defined as “the process of transferring and sharing knowledge among individuals or teams to reduce the time spent on solving a business problem”(Natu & Aparicio, 2022, p.2). To measure knowledge sharing the study chose Natu and Aparicio (2022) measuring scale. The scale includes six items. An example of the items is “My virtual team members share their ideas openly”.

According to Tseng *et al.* (2019, p.1358), media richness is defined as "the degree to which a medium can facilitate shared meaning". To measure media richness, the study chose Dennis and Kinney (1998) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes seven items. An example of the items is "Digital media facilitates reaching agreement when there are different points of view".

Virtual team performance is defined as “the ability of members to have results compliant with the targeted objectives by taking into account the impact of these results on the employees. Consequently, the efficiency of a virtual team is determined by the team's performance and its members’ satisfaction” (Ben Sedrine *et al.*, 2020, p.3). To test virtual team performance, the study chose Wickramasinghe and Nandula (2015) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes eight items. An example of the items is “My virtual team members adhere to time schedules”.

Table 3.7 shows the variables, their measurement tools, and the sources that were taken from them:

Table 3.7 Measurement Items in Research Instrument

Variable	Items	Sources
Virtual Team performance	My virtual team members adhere to time schedules.	(Wickramasinghe & Nandula, 2015) and (Jafari, 2021)
	My virtual team members adhere to the budget.	
	My virtual team members are able to meet the team's goals.	
	My virtual team members are able to meet the team's vision.	
	My virtual team members have a reputation for work excellence.	
	My virtual team members are productive.	
	My virtual team members are sincere to improve our team's efficiency.	
	Overall, my virtual team members' performances are satisfactory.	
Trust	I believe my virtual team members are honest.	(Choi <i>et al.</i> , 2008)
	I believe my virtual team members are reliable.	
	I think my virtual team members treat each other with mutual trust.	
	I think my virtual team members work for the team's success.	
	I believe my virtual team members are knowledgeable in their respective areas.	
	I believe my virtual team members are competent in their respective areas.	
Cohesion	My virtual team members work as a very cohesive unit.	(Lin <i>et al.</i> , 2008)
	My virtual team members are working effectively as a cohesive unit.	
	My virtual team members work well together.	
	My virtual team members spend time together through ICT.	
Relationship Building	My virtual team members rely on each other.	(Lin <i>et al.</i> , 2008)
	My virtual team members consult each other when they need support.	
	My virtual team members experience a sense of shared	

Variable	Items	Sources
	goals and objectives.	
	My virtual team members understand the information shared between them as a team.	
	My virtual team members share information as one team.	
	My virtual team members are interested in building a good relationship with one another.	
Communication	When I communicate with my virtual team members, they understand my concerns.	(Wei <i>et al.</i> , 2018)
	When I communicate with my virtual team members, I can provide information as required.	
	When I communicate with my virtual team members, I express my opinion in understandable terms.	
	When I communicate with my virtual team members, I make sure they understand what I mean.	
	When I communicate with my virtual team members, I treat them with respect.	
Virtual leadership	Our virtual team leader promotes learning from experience.	(Lin <i>et al.</i> , 2019)
	Our virtual team leader promotes tolerating mistakes up to a certain point.	
	Our virtual team leader acts as an adviser.	
	Our virtual team leader considers 'control' as a strategy to accomplish the team objectives.	
	Our virtual team leader promotes the acquisition of external knowledge.	
	Our virtual team leader encourages employees to share and apply their knowledge.	
Knowledge Sharing	My virtual team members share their ideas openly.	(Pangil & Chan, 2014)
	My virtual team members are willing to share knowledge with others.	
	My virtual team members use the knowledge of team members.	
	My virtual team members with expert knowledge are willing to help others in this team.	
	My virtual team members keep their best ideas to themselves.	
	My virtual team members share their knowledge without expecting anything in return.	

Variable	Items	Sources
Media Richness	Digital media are flexible, which helps achieve team goals.	(Dennis & Kinney, 1998)
	Digital media help us reach a common vision when opinions differ.	
	Digital media help us share opinions among my virtual team members.	
	Digital media help communicate ideas easily to my virtual team members.	
	Digital media help us to communicate quickly with my virtual team members.	
	Digital media help us understand each other better.	
	Digital media help us speed up communication between my virtual team members.	

Source: (Lin et al., 2008; Choi et al., 2008; Wickramasinghe & Nandula, 2015; Wei et al., 2018; Lin et al., 2019; Dennis and Kinney, 1998; Jafari, 2021; Pangil and Chan, 2014).

3.7.2 Research Instrument Validity

Validity indicates that the scale contains a sufficient and representative set of elements that express the concept and that the more the elements of the scale increase from the scope of the concept being measured, the greater the validity of the content (Sekaran & Bougie, 2016). Given that the study variables are derived from previous studies and validating these variables in previous studies does not necessarily mean reliability and satisfactory validity, precautions must be taken to ensure the validity of the study scale by taking several measures such as ensuring the questionnaire is verified by experts in the academic and practical field.

The instrument's content validity was assessed by involving experts who offered insightful commentary on each of the questionnaire's items. The study instrument was presented to a number of specialists, including academics specialized in human resources and leadership. It was also presented to arbitrators specializing in the English language to verify the linguistic content. Five professionals, namely Associate Professor Dr. Nurita Binti Juhdi, Associate Professor Dr. Zabeda Bt. Abdul Hamid, Associate Professor Dr. Rodrigue Ancelot Harvey Fontaine, Associate Professor Dr. Rafikul Islam, and Associate Professor Dr. Amirah Binti Ahmad Suki,

were selected from the Faculty of KENMS at IIUM. Moreover, Assist Prof. Dr. Abdulmajid Mohammed Aldaba is a professional from the IIUM Faculty of Education. And Assistant Professor Dr. Rimun Murad, an English language specialist from Temple University's College of Liberal Arts. The experts discussed and rated the questionnaire's variable scales as acceptable or unacceptable, offering recommendations if any for each item. The items that were recommended for modification were reword in light of the reviewers' report at the conclusion of the content validity procedure (refer to Appendix -7).

The comments from the arbitrators were diverse. Some of them concerned the negative sentences in the items and they advised modifying them into positive sentences. For example, with regard to the media richness variable, one of the items was as follows: "When we disagree, the communication conditions made it more difficult for us to come to agreement", it has been changed to "Digital media help us reach a common vision when opinions differ". In addition, some of them suggested adding other item to some variables, for example, with regard to the knowledge sharing variable, it was proposed to add a new item as follows "My virtual team members share their knowledge without expecting anything in return". You can refer to Appendix -7 to view the comments and suggestions of some arbitrators. Table 3.8 shows the number of specialists who were sent to test the validity of the content of the study tool.

Table 3.8 Face Validity of the Study Instrument

	Name	Position	Workplace	Department	Specialization
1	(Assoc. Prof.) Dr. Nurita Binti Juhdi	Lecturer	IIUM Gombak Campus - Faculty of KENMS	Business Administration Department	Human Resources Development
2	(Assistant Professor) Dr. Zabeda Bt. Abdul Hamid	Lecturer	IIUM Gombak Campus - Faculty of KENMS	Business Administration Department	Human Resources Development
3	(Assoc. Prof)	Lecturer	IIUM Gombak	Business	Leadership

	Dr. Rodrigue Ancelot Harvey Fontaine		Campus - Faculty of KENMS	Administration Department	
4	(Professor.) Dr. Rafikul Islam	Lecturer	IIUM Gombak Campus - Faculty of KENMS	Business Administration Department	Business and Management
5	Assistant) (Professor Dr. Amirah Binti Ahmad Suki	Lecturer	IIUM Gombak Campus - Faculty of KENMS	Business Administration Department	Business and Management
6	Assistant) (Professor Dr. Abdulmajid Mohammed Abdulwahab Aldaba	Lecturer	IIUM Gombak Campus - Faculty of Education	Educational Administration	Educational Administration
7	(Assistant Professor of Instruction) Dr. Rimun Murad	Lecturer	Temple University - College of Liberal Arts	Department of English	College Writing and Composition

Source: Developed by the researcher

3.7.3 Pilot Study and Research Instrument Reliability

In pilot testing, the respondents should be similar to the items of the study population to ensure that the questionnaire items are appropriate (Saunders *et al.*, 2009). The main goals of the practice test are to assess the reliability of content such as sequence and flow of questions, ambiguity or bias in words, and simplicity of the questionnaire. On the other hand, a pilot test is a test of the coordination and clarity of scales, the length of the questionnaire, and the time of filling out the questionnaire (Bhattacharjee, 2012). The pilot study is used to measure the reliability of the study instrument. In the current study, Cronbach's alpha coefficient has been used to measure the reliability and stability of the study.

The pilot study was conducted to test the reliability of the study instrument. Cronbach's alpha coefficient was used to measure reliability. The data was collected from a sample of 30 administrative employees in Malaysian universities. Moreover, the pilot test was conducted in May 2023. It was found that all the variables in this study had high reliability, as the value of the Cronbach alpha coefficient exceeded the acceptable minimum of 0.7 (Hair Jr *et al.*, 2014; Pallant, 2010) by far, as the value of the minimum coefficient was 0.9 in all variables. The Cronbach alpha reliability test for each variable showed the following results (Trust 0.981, Cohesion 0.917, Relation Building 0.962, Communication 0.936, Virtual Leadership 0.907, Media Richness 0.974, Knowledge Sharing 0.937, and Virtual Team Performance 0.979). It is clear from Table 3.9 that all variables had high reliability, as they all exceeded the acceptable minimum. It can be concluded from these results that the study instrument has a high degree of reliability and these results can be relied upon to conduct the actual study. Table 3.9 represents the reliability test of the current study instrument.

Table 3.9 Reliability Test of Study Instrument

Constrict	Cronbach Alpha Indicator	Threshold	Decision
Trust	0.981	0.70 (Hair Jr <i>et al.</i> , 2014) and (Pallant, 2010)	Acceptable
Cohesion	0.917		Acceptable
Relation Building	0.962		Acceptable
Communication	0.936		Acceptable
Virtual Leadership	0.907		Acceptable
Media Richness	0.974		Acceptable
Knowledge Sharing	0.937		Acceptable
Virtual Team Performance	0.979		Acceptable

In the current study, figure 3.5 shows the research paradigm, approaches of theory development, methodological Choice, research strategy, time horizon, type of investigation, purpose of the research, and sample design that was adopted in the current study.

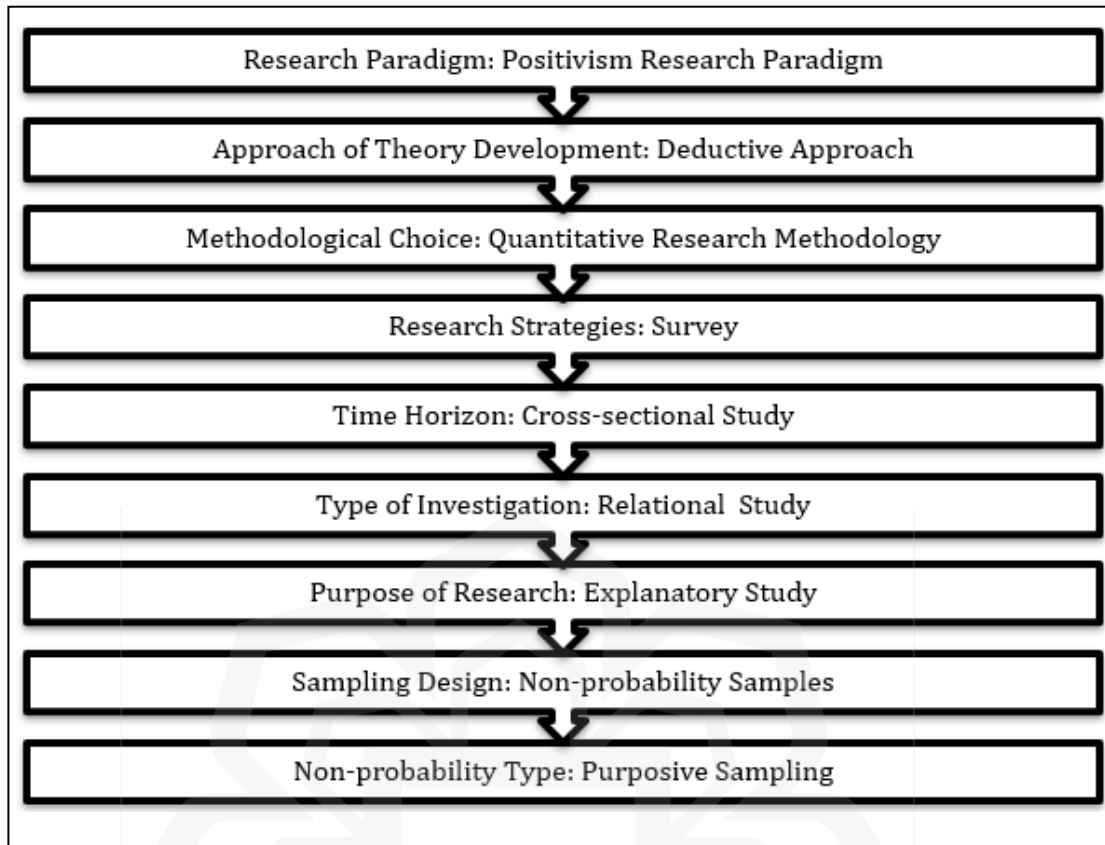


Figure 3.5 Research Philosophy and Research Design

3.8 CHAPTER SUMMARY

This chapter provides an illustration of the research philosophy and methodology used in this study, which includes several stages such as research philosophy, research paradigm, the approach to theory development, research design (methodological choice, research strategies, time horizon, data collection, type of investigation, and purpose of research), sampling process including (population of the study, sample frame, sampling design, sample size, unit of analysis, and sampling procedure). Moreover, the previous chapter addresses research instrument inclusive (research instrument design, research instrument validity, pilot study, and research instrument reliability). The following Figure 3.5 shows a summary of the research philosophy in this study in addition to the research methodology and research design.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

An examination of the study's findings is presented in the fourth chapter. The research was done in the following phases: After reviewing the entire data gathering process and all of its phases, the data was handled and checked for outliers and missing values. The analysis's assumptions were then put to the test, including the tests for linearity, homoscedasticity, multicollinearity, absence of correlated errors, and normal distribution. The reliability of the study tool was also tested using Cronbach's alpha coefficient and split-half. After that, a descriptive analysis of the study sample was conducted. The next step was to conduct EFA, then CFA, and after verifying the goodness indicators for the pooled measurement model and testing discriminant validity and convergent validity, we moved to the path analysis test, and then the study hypotheses were tested, where the hypothesis testing was reviewed in detail to answer the research questions.

4.2 DATA COLLECTION RESULTS

4.2.1 Research Ethics Approval

To collect the data necessary to conduct data analysis, applications were made to get the required clearances to collect data from the target study population, which is the public and private universities in Malaysia that are ranked among the top ten in the QS classification. These files contain a request to disseminate a scientific research questionnaire that was submitted to the IIUM's Post Graduate Studies Unit (PG Unit), KENMS. As stated in Appendix 1, the supporting letter was issued by the PG Unit on April 4, 2023. The following details were included in the letter, which was addressed to the intended study population: a declaration of the researcher's information, the title of the study, supervisor's names, an assurance of the confidentiality of the data, and

the reason for gathering it. The signature of the Deputy Dean of PG Unit, KENMS at IIUM, as well as the department name and university were also included in the letter.

The second document was the Study Protocol, which was turned in to the IIUM's Research Management Centre (RMC) and specifically to the IIUM Research Ethics Committee (IREC), which became active on May 5, 2023. Under the number REC 2023-090, the study protocol was approved on May 19, 2023, and obtained from the IREC on May 25, 2023. The research title, registration date, primary investigator, co-investigator, study site, sample size, and letter expiration date are all listed in the study protocol. Additionally, as seen in Appendix 2, it has the signature of the chairperson of the IREC. IREC approved the study protocol subject to the following requirements:

- a) Submit the 'Continuing Review Form' 30 days before expiry date to renew Ethical Approval.
- b) Notify IREC of any change in protocol and obtaining further ethical approval as appropriate.
- c) Report any adverse incident during the course of a study to IREC even if the incident is not directly related to the study.
- d) Report to the IREC within 72 hours for all internal SAEs (occurring in IIUM PI site).
- e) Report in a prompt manner if the information impacts the continued ethical acceptability of the trial for external SAEs (occurring in participants at other sites).
- f) Report any major protocol deviation occurs within 5 working days.
- g) Complete and submit the End of Project Report Form to the IREC Secretariat's Office.

- h) All records and data subjects are confidential and used only for the purposes of this study and all issues and procedures on data confidentiality must be observed.

Based on the ethical considerations specified by the IREC, and the study protocol, the data was collected during June and July of 2023 and was coded and kept confidentially.

4.2.2 Participant Recruitment

The current study adopted a non-probability sampling strategy since it lacked a sample frame (a list of units of analysis). The administrative employees of the top ten Malaysian Universities as determined by the QS rankings serves as the study's unit of analysis. These employees were selected based on their experience with partially or entirely virtual work during the COVID-19 era and thereafter.

However, the current study will adopt purposive sampling, as a type of non-probability sampling, because potential respondents must meet certain criteria (Sekaran & Bougie, 2016). The phrase "purposive sampling" refers to the process of selecting a subset of the sample population based on characteristics or criteria selected by the researcher to identify a selection of people who can provide the required data.

Employees who worked virtually either entirely or partially in teams in departments, divisions, offices, and units in HEIs in Malaysia are involved in the study. The following requirements must be met for an individual to be included in the sample: they must be employed in HEIs; they must have experience working as administrative staff non-academic staff; they must have worked partially or entirely virtually; and they must have worked in a team, whether it be in an office, unit, or department. Table 4.1 represents the criteria that must be met by study participants.

Table 4.1 Criteria that must be met by Study Participants

Criteria	Examples	Status	Decision
Work in HEIs (Top-Ten Universities)	-Employees in Etiqa Health Insurance Corporation	They do not work under the Malaysian Ministry of Higher Education	Exclude
Experience of working virtually during COVID-19 and beyond	-Health sector employees -Occupational health and safety employees -Employees responsible for student accommodation -Cleaning and Maintenance employees.	They haven't tried virtual work	Exclude
Work as administrative	-Academic staff	They have no administrative work	Exclude
Work within a team	- Employee work in Offices, Units, Division, or Departments	They work within a team	Include

Table 4.1 shows specific criteria that determine who can participate in the study and who will be excluded. It required participants to work within the Malaysian higher education sector, specifically the top ten universities, and to have experience working virtually during the COVID-19 period. Staff from certain sectors such as Occupational Health and Safety, Student Accommodation, Cleaning, and Maintenance have been excluded due to their inexperience in virtual working during COVID-19. In addition, the study focused on administrative roles, excluding academics, and thus the study included employees working as teams in offices, units, or departments that met the criteria specified in the current study.

4.2.3 Informed Consent

The process of gathering data started with visits to the selected universities, where supporting documentation for data collection was shown. These included requests for the distribution of questionnaires that were issued by the PG Unit of KENMS of the IIUM (refer to Appendix 1) and the study protocol issued by IREC (refer to Appendix 2). The objectives of the study and the requirements for participation were laid out in

meetings with administrators, department heads, and office managers at these universities. Data confidentiality was emphasised, with strict adherence to scientific norms and use only for research reasons. The fact that involvement in the study is entirely voluntary was also made clear. When the targeted universities agreed to participate (refer to Appendix 4 and Appendix 5), the questionnaires were distributed to administrative staff members in different departments, offices, and units (refer to Appendix 6).

During the data collection process, it was decided to eliminate administrative staff members who were employed by certain departments, offices, and units but did not fit the sample requirements. For instance, this included staff members who haven't worked virtually throughout the COVID-19 time or later, such as those in the university's health departments, maintenance, cleaning, and security departments, as well as staff members who work in the residence halls. Additionally, because they are associated with the Ministry of Health rather than the higher education sector, employees related to Etiqa health insurance were not included. Additionally, academics from the targeted universities were not included in the current study.

4.2.4 Self-Administered Survey Arrangement

The administrative staff in the selected Malaysian institutions' offices, departments, and units received a hard copy of the questionnaire. There were multiple steps involved in delivering the questionnaires, which were as follows: the first step was meeting with officials in offices, departments, and units during regular business hours to discuss the purpose, scope, and requirements for taking part in the study.

In the second phase, all employees who are present at work have received questionnaires, and they are given a suitable amount of time to react. The time frame for responding varied from one day to a week, depending on the requests of the respondents to make sure that the respondents gave the right response. The third stage involved responding to their queries and questions regarding specific terminology. The fourth stage involved gathering questionnaires from the study sample by the time frame decided upon with the participants or the authorities in each team. After the

questionnaires were sorted in the last step, the following data were obtained as shown in Table 4.2.

Table 4.2 Status of Distributed Questionnaires

Type of Questionnaire	Number	Percentage
Questionnaires Distributed	435	100%
Empty Questionnaires	30	6.89%
Missing Questionnaires	28	6.43%
Excluded Questionnaires	4	0.92%
Valid Questionnaires	373	85.74%

The total set of questionnaires for analysis in this study was 435, which were distributed. Of them, 30 (6.89%) were discovered empty questionnaires, 28 (6.43%) were missing, and 4 (0.92%) were purposefully left out as they didn't fit the study's requirements. In the end, 373 (85.74 %) questionnaires were deemed valid; these represented completed and qualified responses that were utilised in the study. Additionally, 373 valid questionnaires were received for analysis, which is more than the 240 sample size needed for the study.

4.2.5 Data Collection Procedures

The study population was made up of a subset of universities in Malaysia, specifically the top ten universities in the country as ranked by QS, which include Universiti Malaysia (UM), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM), Universiti Utara Malaysia (UUM), UCSI University (UCSI), Management and Science University (MSU), Taylor University, and Universiti Teknologi Petronas (UTP).

The necessary documents were submitted to targeted universities to allow the collection of data from these universities. The required paperwork, including a letter distributing questionnaires signed by the Deputy Dean of PG Unit, KENMS at IIUM, and study protocol issued by the IIUM, Research Management Centre, and the Research Ethics Committee (IREC). Table 4.3 shows universities responded in four different ways:

Table 4.3 Responses from Malaysian-Targeted Universities

Statues	Name	Number	Percentage
Verbal Consent	UM, UPM, UKM, UUM	4	40%
Written Approval	UCSI, MSU, UTM.	3	30%
Refused to Cooperate	Taylor University	1	10%
No Response	UTP- USM	2	20%
Total	10	10	100

Table 4.3 presents the responses that various institutions provided on the questionnaires that were given to their administrative staff members. UM, UPM, UKM, and UUM verbally consented, making up four out of the universities contacted and accounting for 40% of the total. The three universities UCI, MSU, and UTM that make up 30% of the sample request written approval. Among the universities contacted Taylor University showed that would not collaborate which makes up 10%. Of those, UTP and USM did not respond, accounting for 20% of the total.

Based on their QS rankings in 2023, the table below shows the distribution and status of questionnaires in various Malaysian universities. Out of the 75 questionnaires that UM University distributed, 64 valid responses were received, with 3 being returned blank and 8 missing. Out of the 70 that UPM University distributed, 61 were valid, with 5 being blank and 4 missing. UKM University distributed 60 responses, of which 48 were valid. The remaining 10 were blank, 1 was missing, and 1 was excluded. With 3 and 1 missing, respectively, UTM distributed 40 in Johor and 70 in KL, yielding 34 and 39 legitimate responses.

50 questionnaires were submitted by UCSI University; none were blank, but there were 4 missing and 3 omitted, resulting in 43 valid answers. There were 12 valid responses out of the 25 that UUM University provided, with 9 being blank and 4 missing. MSU University provided 75 valid responses, none of which were missing or

blank. There was no data available from UTP, USM and Taylor's Universities. Out of the 435 distributed questionnaires, 373 were deemed valid for analysis across these universities, whereas 30 were blank, 28 were missing, and 4 were eliminated. Table 4.4 reveals distributing questionnaires to top-ten Malaysian universities.

Table 4.4 Distributing Questionnaires to Top-Ten Malaysian Universities

QS Ranking in Malaysia 2023	QS Ranking in the world 2023	University	Distributed Questionnaires	Blank Questionnaires	Missing Questionnaires	Excluded Questionnaires	Valid Questionnaires
1	70	UM	75	3	8	0	64
2	123	UPM	70	5	4	0	61
3	129	UKM	60	10	1	1	48
4	143	USM	-	-	-	-	-
5	203	UTM-Johor	40	3	3	0	34
		UTM - KL	70	0	1	0	39
6	284	Taylors University	-	-	-	-	-
7	284	UCSI	50	0	4	3	43
8	361	UTP	-	-	-	-	-
9	481	UUM	25	9	4	0	12
10	601-650	MSU	75	0	3	0	72
Total	-	-	435	30	28	4	373

4.2.6 Data Keeping and Storage

The hard copies of the questionnaires were transcribed into an Excel file, where the data was coded, conveniently and safely saved on the laptop, and stored in a secret file to guarantee the confidentiality of the information and its safe preservation and storage. It follows strictly the SOP of IIUM. Being aware that all data is encrypted and tagged, and that sensitive personal data—like study participants' names—is not included in it. Additionally, hard copies of the surveys were stored in a secure location to guarantee that the data would not be examined. The data were collected, transcribed, and stored in compliance with the study protocol, adhering to all ethical guidelines because they are private documents that are only accessible by the researcher.

4.2.7 Data Analysis

4.2.7.1 Analysis Tools

In this research, the analysis will be conducted by applying the Statistical Package for Social Science program (IBM SPSS) and Analysis of Moment Structures program (IBM SPSS AMOS). In detail, SPSS software will be used for the following analysis; data screening test (outliers and missing values), analysis assumptions test (linearity, homoscedasticity, multicollinearity, absence of correlated errors, and normal distribution.), reliability test, descriptive analysis, and EFA. IBM AMOS software will be used for the following analysis; CFA (measurement model assessment), and path analysis (structural model assessment) to test study hypotheses including mediating test and moderating test.

4.2.7.2 Data Analysis Procedures

The data processing will proceed through several stages as follows, the first phase includes data collection and data entry using IBM SPSS. The second phase included data screening including outliers and missing values test using IBM SPSS. The third phase included a statistical assumptions test including the tests for linearity, homoscedasticity, multicollinearity, absence of correlated errors, and normal distribution using IBM SPSS. The fourth phase included a reliability test using the alpha Cronbach coefficient and split-half using IBM SPSS.

The fifth phase included descriptive analysis using IBM SPSS. The sixth phase included EFA using IBM SPSS. The Seventh phase included CFA using IBM AMOS including verifying the goodness indicators for the pooled measurement model and testing discriminant validity and convergent validity. The final stage phase included path analysis using IBM AMOS where the study hypotheses were tested, to answer the research questions. Figure 4.1 shows the data processing steps that took place in the current study, which included eight basic stages.

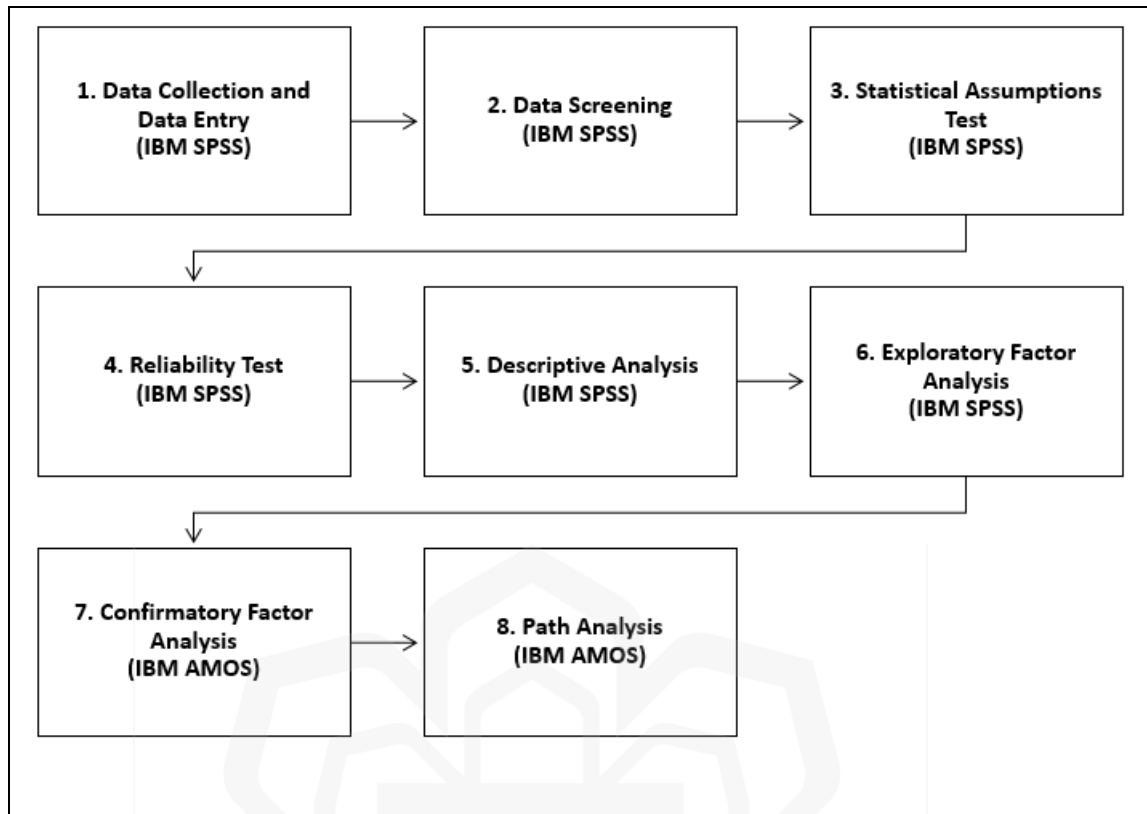


Figure 4.1 Data Analysis Processes in the Current Study

4.2.7.3 Justifications for Using SEM

SEM is a statistical method that takes hypothesis testing as an approach to analyzing and understanding phenomena (Byrne, 2013). In theories in which the variables have multiple relationships, SEM can examine some dependency relationships simultaneously, for example, one variable may play the role of an independent variable while it plays the role of the dependent variable in another relationship in the same model. Other methods of analysis do not help in testing this type of relationship. SEM is the most appropriate technique in such cases (Dutta & Mandal, 2018).

4.3 DATA SCREENING

The process of cleaning data includes identifying missing values, and outliers, and testing assumptions of the analysis. Hair.Jr *et al.* (2014) state that although data examination takes a lot of time, it is an important but often overlooked first step in the

analysis process. In this step, researchers determine the impact of missing data, look for outliers, and confirm the underlying hypotheses of different multivariate techniques. These evaluation tasks aim to reveal hidden effects in addition to presenting the real data since these "hidden" effects are often disregarded (Hair, Jr *et al.*, 2014).

4.3.1 Missing Values

The concept of missing data is a common term when starting to process data. After data collection, specialised data software finds inaccurate or missing data entries. One almost inevitable component of social science research is incomplete or missing data (Byrne, 2016). During the data processing steps, missing data is usually found and address during the data analysis phase (Sekaran & Bougie, 2016).

Missing data emerges for a variety of reasons after data collection from the target study population. Unstructured missing data might originate from a number of causes, most of which are without the researcher's control. These situations include missing data collection sessions, choosing not to answer certain questionnaire items, declining to answer private questions about personal information like age or income, technical problems like equipment malfunctions, or study participant attrition (Byrne, 2016). Furthermore, confusing questioning, participants' hesitancy, or their incapacity to reply to a question for a variety of reasons can all result in missing data (Sekaran & Bougie, 2016). Researchers may find missing data to be inconvenient, as it typically results from errors made in data entry or collection processes or from respondents' decisions to withhold their responses (Hair, Jr *et al.*, 2014).

There are different methods to handle missing data. The first way to deal with missing data is to simply discard it after the analysis is complete. When there is a significant amount of missing data, researchers can choose to delete the missing records and set rules for addressing these occurrences. It may be wise to dismiss the complete questionnaire and remove it from the dataset that will be analysed if a sizable number, like 25% of the questionnaire items are left unanswered. If this

happens, it is important to record in the final report the number of returned but useless responses because of significant missing data (Sekaran & Bougie, 2016).

Moreover, this method is available by default in the majority of statistical software packages and is compatible with all datasets. Nevertheless, one significant disadvantage is the possibility of sample size reduction, which could occasionally occur to an inappropriate degree, especially when examining that particular variable (Sekaran & Bougie, 2016). By using listwise deletion, only full records are taken into consideration for analysis by eliminating any cases in the dataset that have any missing values. As a result, the final sample that is utilised in the calculations only includes cases that have complete data. The loss of information resulting from the smaller sample size is this method's main disadvantage, though (Byrne, 2016). To reduce data variability and possibly introduce biases, researchers may decide to exclude all occurrences of missing values. This is especially likely if certain sets of observations have been systematically removed (Hair Jr. *et al.*, 2014).

The second choice is to look at the participant's responses to previous questions and use their response pattern to deduce a plausible explanation for the missing response. The third option entails appending to the missing field the average value of all respondents who have responded to that particular question (Sekaran & Bougie, 2016). Replacing the missing score with an approximated value is one method of handling missing data. Mean imputation is a popular technique among these that substitutes the arithmetic mean for the missing value. However, using mean imputation is not advisable for SEM that depends on variance and covariance data (Byrne, 2016). Most missing value handling strategies, including nearest neighbour, mean replacement, pairwise deletion, work best with moderately high amounts of missing data (less than 5% per indicator) and have little effect on the results of the study (Hair Jr. *et al.*, 2014).

According to the above, four questionnaires were excluded in the current study because of a significant amount of missing data—more than 25% of the total data in these surveys. The percentage of data distributed based on the targeted institutions and the surveys that were omitted because of missing data are displayed in Table 4.5.

Table 4.5 Missing Data in Questionnaires Distributed by University

University	Distributed Questionnaires	Excluded Questionnaires	Percentage
UM	75	0	-
UPM	70	0	-
UKM	60	1	0.23 %
USM	-	-	-
UTM-Johor	40	0	-
UTM - KL	70	0	-
Taylors University	-	-	-
UCSI	50	3	0.69 %
UTP	-	-	-
UUM	25	0	-
MSU	75	0	-
10	435	4	0.92 %

Table 4.5 outlines the distribution of questionnaires among several universities and the number excluded due to missing data, presented as percentages. Universiti Malaya (UM) distributed 75 questionnaires without any exclusions noted. Similarly, Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia in Johor (UTM-Johor) distributed 70 and 40 questionnaires respectively, with no exclusions reported. Universiti Kebangsaan Malaysia (UKM) had 60 questionnaires distributed, with 1 (0.23%) excluded due to missing data.

There are no specific distribution or exclusions data available for Taylor's University, Universiti Sains Malaysia (USM), or Universiti Teknologi Petronas (UTP). Out of the 50 surveys that UCSI University distributed, 3 (0.69%) were omitted because of incomplete data. Twenty-five surveys were provided by Universiti Utara Malaysia (UUM) with no mention of exclusions. 75 questionnaires, free of any exclusions, were delivered by Management and Science University (MSU). Overall, 435 questionnaires were distributed across all campuses; 4 (0.92%) were omitted owing to incomplete data.

4.3.2 Outliers Values

An instance of an illogical response is an outlier, which is an observation that differs noticeably from other observations. Remarkably, although frequently associated with

errors in data entry, outliers are not necessarily false. Extensive study is required to confirm the accuracy of outliers because of their ability to significantly impact research conclusions (Sekaran & Bougie, 2016). Outliers are observations that stand out from the rest due to a specific mix of attributes (Hair. Jr *et al.*, 2014).

In addition, outliers are cases in a given dataset where scores deviate significantly from the average. According to Byrne (2016), a multivariate outlier shows extreme scores on two or more variables, whereas a univariate outlier shows excessive scores on just one variable. Hair. Jr. *et al.* (2014) state that outliers can be categorised into four groups according to the cause of their uniqueness, as seen in Table 4.6.

Table 4.6 Types of Outliers and the Method of Treatment

No	Type of Outliers	Example	Treatment
First Class	Procedural Error	Data entry error or a mistake in coding	If these outliers are missed during the data cleaning process, they should be removed or noted as missing values.
Second Class	Extraordinary Event	Rainfall data during hurricane days that differ from other normal weather days	The extraordinary event must be weighed against the research's goals by the investigator. In that case, the analysis ought to keep the outlier. If not, it ought to be removed.
Third Class	Extraordinary Observations (with no explanation)	A distinct and distinctly different profile appears.	These outliers are the most likely to be left out, but if the researcher believes they accurately reflect the population, they might be kept in.
Fourth Class	Unique in their Combination	An outlier is an observation that, while falling within the typical range of values for each variable, has a distinct value combination for each variable.	Unless there is concrete proof that discredits the outlier as a legitimate part of the population, the researcher should hold onto the observation.

Source: (Hair Jr *et al.*, 2014)

There are different methods to detect and identify outliers. Analysing the distribution of nominal and/or ordinal variables entails evaluating minimum and maximum values in conjunction with frequency tables, which expedites the discovery of notable outliers. Visual aids such as scatterplots and boxplots are useful for

identifying outliers in interval and ratio data (Sekaran & Bougie, 2016). A multivariate viewpoint on Mahalanobis is another method for identifying outliers. One popular technique for finding multivariate outliers is to compute the squared Mahalanobis distance (d^2) for each case separately. This statistical measure counts the difference, expressed in standard deviation units, between the sample means (centroids) for all variables and the set of scores for a given case. In this case, an outlier will have a d^2 value that is noticeably different from every other d^2 value (Byrne, 2016).

The second method of detecting outliers is a univariate perspective. One approach to identifying outliers is through a univariate perspective. Assessing the distribution of observations for each variable in the study and locating instances that reside at the extremes (high or low) of these distributions are necessary steps in the process of identifying individual outliers. The key problem is figuring out when anything qualifies as an outlier. Converting data values into standard scores (Z-Score), where the mean is 0 and the standard deviation is 1, is one popular technique. It is easy to compare variables when you use this standardised format (Hair Jr *et al.*, 2014). Examining all numerical variables to identify exceptional or unusual observations is a necessary step in applying univariate approaches for outlier management. Outliers are often defined as observations with standard scores of 2.5 or above in small sample sizes (80 observations or less). Raising the cut-off point for standard scores to as high as 4 is advised for bigger sample sizes (Hair Jr *et al.*, 2014).

In this study, since the sample size is greater than 80, univariate approaches for treating outliers at 4 standard scores have been used, following the preceding discussion. The separate components were aggregated to form a single variable to identify univariate outliers. IBM SPSS software was also used for this, converting each observation's data values into standardised scores (z-scores). Table 4.7 shows the results of the outlier analysis for different variables using the univariate outlier method.

Table 4.7 Univariate Outlier Method Test Results

Variables	Code	ID of Case	Z-Scores	Threshold	Decision
Trust	Tr	221	-5.11959	Z-Scores $> \pm 4.0$ (Hair Jr <i>et al.</i> , 2014).	Omitted
Cohesion	Coh	No cases	No cases		-
Relation Building	RB	No cases	No cases		-
Communication	Com	No cases	No cases		-
Virtual Leadership	VL	210	-4.25139		Omitted
Media Richness	MR	No cases	No cases		-
Knowledge Sharing	K. Sh	No cases	No cases		-
Virtual Team Performance	VTP	No cases	No cases		-
Total	8	2			2

Out of the eight factors analysed, Z-scores that were more than ± 4.0 were used to identify cases as outliers for virtual leadership and trust. Specifically, Trust had one outlier case (ID 221) with a Z-score of -5.11959, leading to its omission. In contrast, Virtual Leadership had another outlier case (ID 210) with a Z-score of -4.25139, also resulting in its exclusion from the analysis. The remaining variables—Cohesion, Relation Building, Communication, Media Richness, Knowledge Sharing, and Virtual Team Performance—showed no outliers. In conclusion, two instances were determined to be outliers out of the eight variables examined overall, and they were removed from additional examination in accordance with the predetermined Z-score threshold. Consequently, after eliminating outliers, the sample size appropriate for analysis becomes $373 - 2 = 371$.

4.4 STATISTICAL ASSUMPTIONS

Multivariate methods and their univariate equivalents rely on a core set of assumptions that reflect the needs of the statistical theory underneath. While many assumptions are relevant to different multivariate techniques, five assumptions can potentially affect every statistical procedure, multivariate or univariate. According to

Pallant (2010) and Hair Jr *et al.* (2014), these presumptions include normality, homoscedasticity, linearity, multicollinearity, and absence of correlated errors. In this study, the assumptions have been looked at.

4.4.1 Normality

Normality is the core premise of multivariate analysis. It concerns the degree to which the data distribution of a single metric variable conforms to the standard normal distribution, an essential criterion in statistical techniques. All derived statistical tests lose their reliability when there is a significant departure from the normal distribution. This is because using statistical measures like the F and t statistics requires adherence to normality (Hair Jr *et al.*, 2014). When a sample has many responses, the frequency distribution typically assumes the shape of a normal distribution, which is a bell curve.

The sample mean, which is the average of all observations, and the standard deviation, which shows the variability or dispersion of data, may both be estimated using this pattern (Bhattacharjee, 2012). One of the presumptions of parametric data is "normally distributed data" (Sekaran & Bougie, 2016). Multivariate normality is a presumption that underpins most statistical tests and multivariate methods. According to Tabachnick and Fidell (2013), this assumption means that every variable has a normal distribution, as do any linear combinations of these variables. In most cases, it is sufficient to ensure and assess univariate normality across all variables (Hair Jr *et al.*, 2014).

The detrimental effects of deviations from normality decrease with increasing sample sizes. When analysing small samples with 50 or fewer observations, especially fewer than 30, notable departures from normalcy might have a substantial impact on the results. Yet, these effects may disappear if the sample size is 200 or greater. As a result, researchers can typically become less fixated on non-normal variables as sample sizes rise (Hair Jr *et al.*, 2014). Hence, the normal distribution of the variables in the current study does not greatly affect the results, given that the sample size in the current study is 371 questionnaires, which is much more than 200. However, the normal distribution has been tested in three ways: according to the skewness

coefficient, the kurtosis coefficient, and the standard values Z-scores of the skewness and kurtosis coefficients.

The critical values of kurtosis and skewness are indicators used to denote a normal distribution. While there is disagreement over the cut-off point for determining excessive kurtosis concerning big non-zero values, Byrne (2016) (as cited from Kline, 2011) states that values equal to or greater than 7 are frequently regarded as indicating a major departure from normality. In the current study, examining the kurtosis numbers in the table below shows that none of the items show substantial kurtosis when using this benchmark of 7.

Furthermore, there are specified acceptable limits for skewness and kurtosis values because these values frequently differ from zero. According to Hair *et al.* (2010) and Bryne (2010), there is a deviation from normality when the kurtosis coefficient surpasses ± 7 or the skewness coefficient exceeds ± 2 . However, broader values of ± 3 for skewness and ± 10 for kurtosis are suggested by Kline (2016) and Demir (2022). In the current study, the skewness and kurtosis test findings are within the suggested ranges, which is consistent with these standards and suggests that the data are normally distributed. Table 4.8 demonstrates the results of the normal distribution test are displayed in based on the skewness and kurtosis coefficients.

Table 4.8 Normality Distribution Testing Results

Variables	Code	Skewness	Std. Error	Z-scores of Skewness	Kurtosis	Std. Error	Z-scores of Kurtosis
Trust	Tr	-0.146	0.127	-1.149	-0.115	0.253	-0.454
Cohesion	Coh	-0.206	0.127	-1.622	-0.032	0.253	-0.126
Relation Building	RB	-0.039	0.127	-0.307	-0.203	0.253	-0.802
Communication	Com	-0.082	0.127	-0.645	-0.161	0.253	-0.636
Virtual Leadership	VL	0.051	0.127	0.401	0.138	0.253	0.545
Media Richness	MR	-0.082	0.127	-0.645	-0.219	0.253	-0.865
Knowledge Sharing	K.Sh	0.029	0.127	0.228	0.282	0.253	1.1146
Virtual Team Performance	VTP	-0.214	0.127	-1.685	0.265	0.253	1.0474

In addition to the skewness and kurtosis coefficients, standardized z-scores of the skewness and kurtosis coefficients are also used to test the normality assumption. By dividing the skewness and kurtosis by the standard error value for the skewness and kurtosis, one may determine the standard z-score for those variables. A normal distribution is indicated by standard z values for skewness and kurtosis within the range of ± 1.96 (Demir, 2022). If any of the computed z values exceed the specified critical threshold, non-normality is present in that specific distribution attribute. Based on a z distribution, this critical value is established based on the intended significance level. According to Hair Jr *et al.* (2014), the critical values that are commonly used are ± 2.58 (with a significance level of .01) and ± 1.96 , (at a .05 significance level). Based on the above, the previous table indicates that all z-score values fall within the limits of ± 1.96 , and therefore the data for the current study show a normal distribution according to this method.

4.4.2 Homoscedasticity

The homoscedasticity assumption in ungrouped data states that the distribution of scores in one continuous variable is essentially constant across all values of another continuous variable. When taking into account a discrete variable (the grouping variable) and a continuous variable (the dependent variable), this assumption in grouped data is consistent with homogeneity of variance (Tabachnick & Fidell, 2013). The variance of the residuals about anticipated DV scores should be the same for all predicted scores (Pallant, 2010). The primary focus of the homoscedasticity assumption is the dependency between the variables. According to Hair Jr *et al.* (2014), homoscedasticity indicates that the dependent variable(s) retain constant variance levels along the range of the predictor variable(s).

There are statistical and graphical tests for homoscedasticity. Levene tests are commonly employed to assess whether the variances of a single metric variable are consistent across several groups, while graphical tests are most commonly used in multiple regression analysis to examine the dependent variable's distribution with respect to the values of the metric independent variables (Hair Jr *et al.*, 2014). The distribution of data on both sides of the line is depicted in the accompanying image,

demonstrating homogeneity and the presence of symmetry in the distribution. Figure 4.2 shows graphical tests for homoscedasticity.

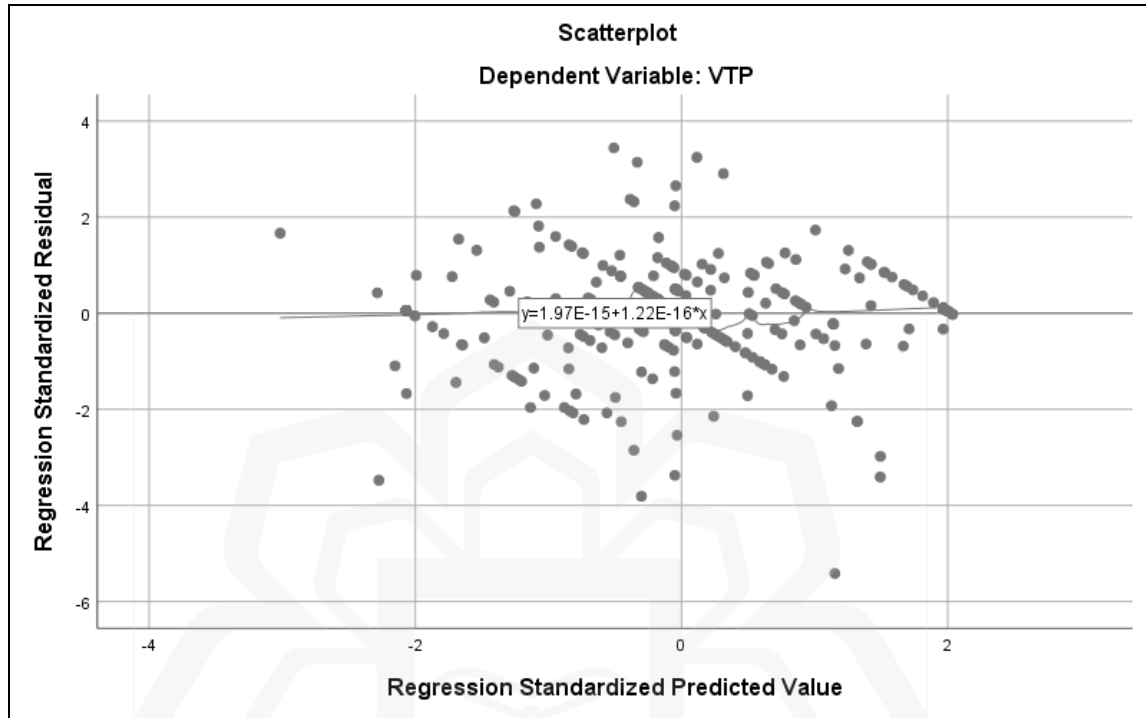


Figure 4.2 Graphical Tests for Homoscedasticity

4.4.3 Linearity

All multivariate techniques that use correlation-based metrics, such as factor analysis, multiple regression, logistic regression, and structural equation modelling, are predicated on the premise of linearity. Correlations only record linear relationships between variables, hence nonlinear effects are not included in correlation values. Relationships' actual intensity is often underestimated by this absence. Therefore, it is necessary to carefully examine every relationship to identify any nonlinearities that might affect correlations (Hair Jr *et al.*, 2014). The relationship between the two variables should be linear. This suggests that a straight line (roughly) should be seen when looking at a scatterplot of scores rather than a curve (Pallant, 2010).

A scatterplot, which shows data points from two metric variables, is the method most frequently used to investigate relationships between two variables. Multivariate normalcy includes linear relationships between continuous outcomes. Bivariate scatterplots make it simple to identify curvilinear relations (Kline, 2016). A linear correlation is indicated by a strong straight line alignment between the points. On the other hand, a curved arrangement could point to a nonlinear relationship that can be handled in several ways. On the other hand, a point arrangement that looks arbitrary could indicate that there is no relationship at all (Hair Jr *et al.*, 2014). The relationship type between each pair of variables in the ongoing investigation is depicted in the provided image, which emphasises that all associations follow a linear pattern in terms of distribution. Figure 4.3 demonstrates the linearity test result by applying a scatterplot.

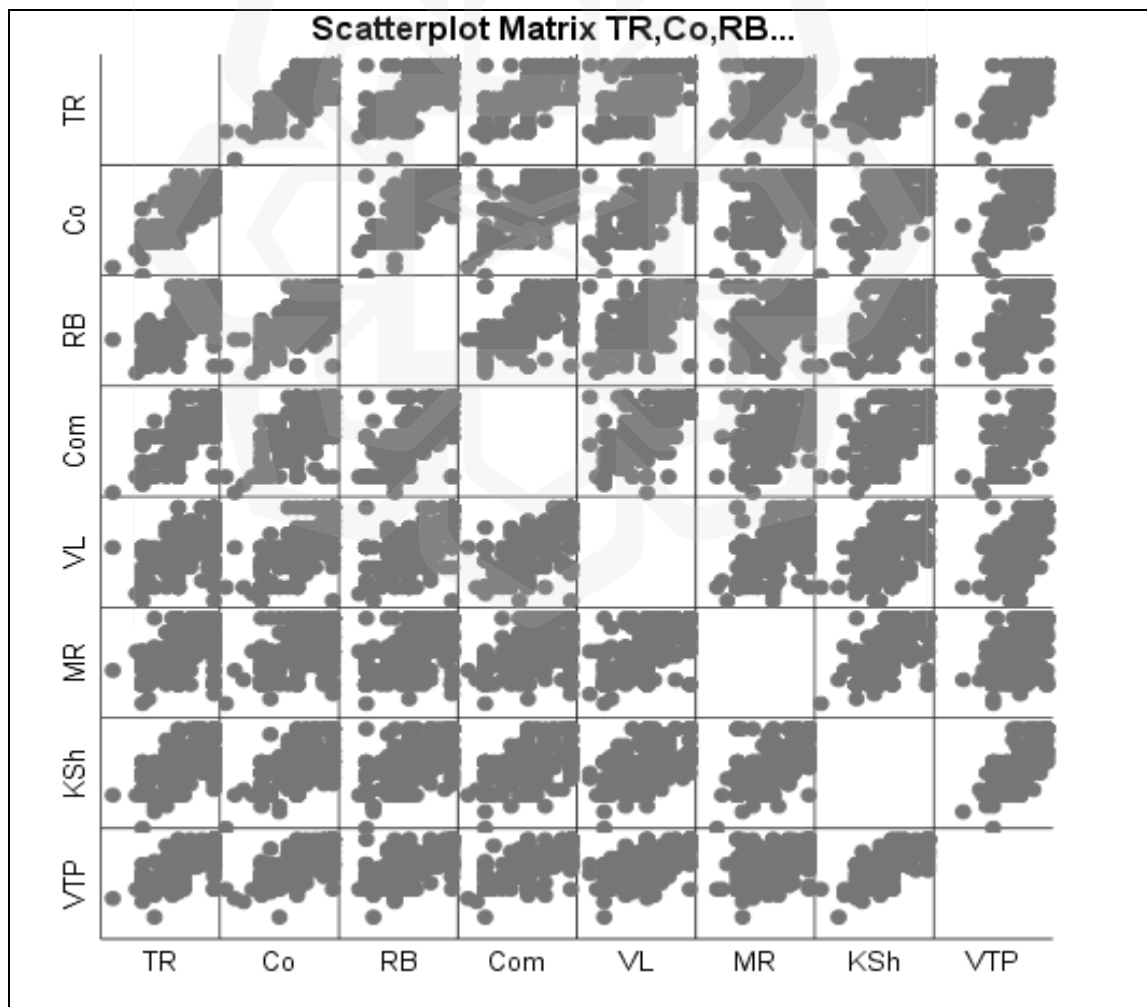


Figure 4.3 Linearity Test Result by Applied Scatterplot

4.4.4 Multicollinearity

Describing the relationship between two independent variables called (collinearity) or more called (Multicollinearity). When the correlation coefficient between two independent variables is equal to 1, total collinearity results; when it is equal to 0, complete absence of collinearity occurs. When one independent variable has a high connection with a set of other independent variables, multicollinearity is revealed. According to Hair Jr *et al.* (2014), singularity is an extreme example of collinearity/multicollinearity in which one or more independent variables completely predict another independent variable (i.e., a correlation of 1.0). When two or more variables exhibit such a strong correlation that they represent the same fundamental construct, this phenomenon is known as multicollinearity (Byrne, 2016).

Tolerance (TOL) commonly used measure of collinearity and multicollinearity. Additionally, the Variance Inflation Factor (VIF) serves as an indicator of how much the standard error of a regression coefficient is affected by the other independent variables. VIF is inversely related to TOL value ($VIF_i = 1/TOL_i$). Elevated VIF values also signal a notable level of collinearity or multicollinearity among the independent variables (Hair Jr *et al.*, 2014). As a rule of thumb, a significant collinearity issue is considered present when VIF exceeds 10 ($VIF > 10$) (Fahrmeir *et al.*, 2013). Multicollinearity at generally acceptable levels (TOL values up to 10, equating to a VIF of 10) (Hair Jr *et al.*, 2014). Table 4.9 shows the results of the multicollinearity test using the VIF and TOL indicating the absence of multicollinearity.

Table 4.9 Collinearity Test Result by TOL and VIF

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			TOL	VIF
(Constant)	.003	.129		.022	.983		
TR	.194	.054	.198	3.570	.000	.228	4.388

Co	.076	.052	.080	1.464	.144	.232	4.304
RB	-.004	.052	-.004	-.086	.931	.275	3.640
Com	.112	.047	.112	2.391	.017	.320	3.126
VL	.233	.048	.218	4.830	.000	.342	2.923
MR	-.017	.038	-.017	-.454	.650	.472	2.116
K. Sh	.401	.043	.392	9.241	.000	.389	2.572
a. Dependent Variable: VTP							

4.4.5 Absence of Correlated Errors

In any dependency analysis, predictions aren't flawless, and encountering a situation where they are is exceedingly rare. Nevertheless, efforts are made to ensure that any errors in prediction are unrelated and uncorrelated with each other (Hair Jr *et al.*, 2014).

4.5 RELIABILITY TEST

In literature, the concept of reliability has frequently been a topic of discussion when it comes to the trustworthiness of measurement instruments. A measure is considered dependable if it produces consistent results and has no measurement error (Green & Salkind, 2014). The accuracy of scores within a certain sample is referred to as score reliability (Kline, 2016). Moreover, a scale's dependability reveals how impervious to random error it is (Pallant, 2010). Reliability is the constancy of a variable or combination of variables in measuring the desired result. Reliability is "the degree to which the observed variable measures the "true" value and is "error free"; consequently, it is the opposite of measurement error" (Hair Jr *et al.*, 2014). Reliable measures will show consistency in their recorded values when many measurements are done.

There are different ways to test the reliability of measuring instruments. Many approaches, including test-retest, equivalent-forms, and internal consistency procedures, can be used to calculate a measurement's reliability coefficient (Green & Salkind, 2014). Test-retest reliability (also known as "temporal stability") and internal

consistency are two often used metrics to assess a scale's reliability (Pallant, 2010). Test-retest reliability is another type of reliability. Internal consistency is a second and more widely used dependability metric (Hair Jr *et al.*, 2014).

There are several methods to gauge internal consistency. The commonly used metric is Cronbach coefficient alpha, which can be accessed through SPSS and provides information about the average correlation between all scale items. Nunnally (1978) proposes a reliability criterion of at least .7. Its values range from 0 to 1, with higher scores indicating increased reliability (Pallant, 2010). As per Hair Jr *et al.* (2014), Cronbach's alpha is a dependability metric that ranges from 0 to 1. Values in the range of 60 to 70 are regarded as the minimal acceptable range. Accordingly, the study has adopted a score of 0.7 to judge the reliability of the study tool. Table 4.10 shows the reliability coefficient for the study variables according to the method of internal consistency and split-half.

Table 4.10 Reliability Test

Constrict	Items	Cronbach's Alpha	Guttman Spilt-half	Threshold	Decision
Trust	6	0.956	0.928	0.70 (Hair Jr <i>et al.</i> , 2014) and (Pallant, 2010)	Acceptable
Cohesion	4	0.929	0.930		Acceptable
Relation Building	6	0.946	0.928		Acceptable
Communication	5	0.944	0.902		Acceptable
Virtual Leadership	6	0.929	0.922		Acceptable
Media Richness	7	0.938	0.876		Acceptable
Knowledge Sharing	6	0.878	0.870		Acceptable
Virtual Team Performance	8	0.957	0.923		Acceptable

The study evaluated the reliability of different constructs by utilising the Cronbach's Alpha and Guttman Split-half techniques. With Cronbach's Alpha coefficients ranging from 0.878 to 0.957 and Guttman Split-half coefficients from 0.870 to 0.930, the results show strong dependability overall. Strong internal consistency inside the constructs is indicated by these coefficients, which are above the 0.70 criterion. Accordingly, the metrics employed to evaluate virtual leadership, communication, cohesiveness, media richness, knowledge sharing, and virtual team

performance are considered appropriate based on predetermined standards (Hair Jr *et al.*, 2014; Pallant, 2010). This implies that the study's instruments are valid for assessing the relevant constructs, guaranteeing the validity of the results.

4.6 DESCRIPTIVE ANALYSIS

The descriptive analysis includes the distribution of the study sample according to universities, demographic diversity, cultural diversity, and the diversity of team members. It also includes a descriptive analysis of the study variables included in the study model as follows:

4.6.1 Distribution of Study Sample

The study population consisted of selected Malaysian universities, specifically the top ten institutions in Malaysia according to QS rankings. The distribution of a study sample among numerous Malaysian universities is shown in the table. It describes the number of times and proportion of participants from every institution in the 371-person sample. With 64 participants, Universiti Malaysia (UM) accounted for 17.3% of the total, closely followed by Universiti Putra Malaysia (UPM) with 61 individuals (16.4%). 44 participants (11.9%) from Universiti Kebangsaan Malaysia (UKM) were included in the subset UKM-KL, which consisted of 2 people (0.5%). UTM-KL (10.5%) with 39 participants and UTM-Johor (9.2%) with 34 individuals comprised Universiti Teknologi Malaysia. Universiti Utara Malaysia (UUM) had 12 participants (3.2%), and UCSI University provided 43 participants (11.6%). With 72 participants, Management and Science University (MSU) accounted for the largest group (19.4% of the sample). Table 4.11 shows the distribution of data by universities.

Table 4.11 Distribution of the Study Sample by Malaysian Universities

University	University	Frequency	Percentage
Universiti Malaysia	UM	64	17.3%
Universiti Putra Malaysia	UPM	61	16.4%
Universiti Kebangsaan Malaysia	UKM	44	11.9%

	UKM-KL	2	0.5%
Universiti Teknologi Malaysia	UTM - KL	39	10.5%
	UTM-Johor	34	9.2%
UCSI University	UCSI	43	11.6%
Universiti Utara Malaysia	UUM	12	3.2%
Management and Science University	MSU	72	19.4%
Total	7	371	100%

Figure 4.4 shows the distribution of the study sample according to the Malaysian universities participating in the study according to the frequency histogram.

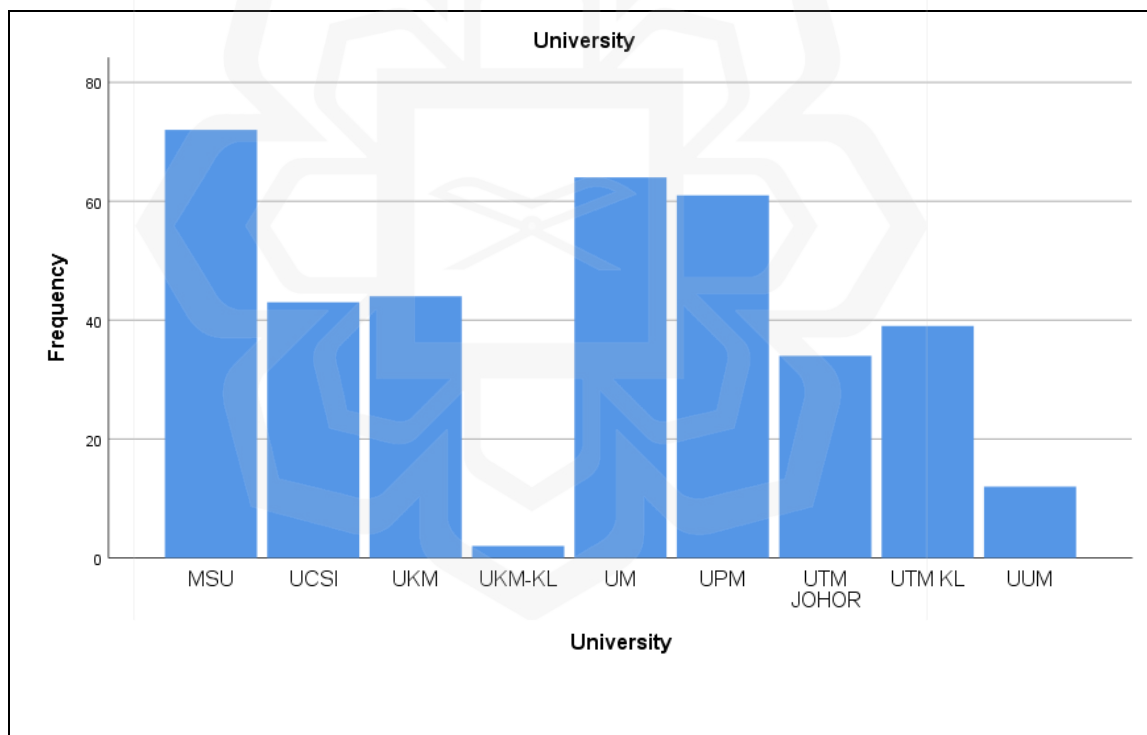


Figure 4.4 Distribution of the Study Sample by the Malaysian Universities

4.6.2 Distribution of Demographic Diversity

The table delineates the demographic diversity within the surveyed population across several key categories. First, the distribution of respondents' genders reveals a significant majority of females (73%), compared to males (27%). Second, looking at functional roles, the majority (91.9%) are classified as members, and only 8.1% are leaders in the study or group that they are a part of. In terms of generational diversity, the analysis reveals that Millennials, who make up 65% of the sample, are more represented than Generation X, which makes up 20.8%. Only 0.5% of respondents are Baby Boomers, and none of the respondents in this dataset are classified as Traditionalists.

The group's educational variety shows that those with a bachelor's degree make up the greatest portion (52%), followed by those with a diploma (20.5%). Along with different levels of education, the distribution includes Master's degrees (12.1%), PhDs (2.4%), secondary school (11.6%), and a smaller category labeled 'Others' (1.3%). Table 4.12 presents a thorough analysis of the diversity distribution among the surveyed population with respect to gender, functional positions, generational cohorts, and educational levels. Notable differences and representations are observed across various demographic categories. Table 4.12 demonstrates the distribution of demographic diversity.

Table 4.12 Distribution of Demographic Diversity

Diversity	Statement					
Gender Diversity	Male			Female		
Frequency	100 (27%)			271(73%)		
Functional Diversity	Member			Leader		
Frequency	341 (91.9 %)			30 (8.1 %)		
Generational Diversity	Traditionalists (born before 1946)	Baby Boomers (born 1946-1964)	Generation X (born 1965-1980)	Millennials (born 1981-1996)	Generation Z (born after 1997)	
Frequency	0(0%)	2(0.5%)	77(20.8%)	241(65%)	51(13.7%)	
Educational Diversity	Secondary School	Diploma	Bachelor	Master	Doctorate	Others
Frequency	43(11.6%)	76(20.5%)	193(52%)	45(12.1%)	9(2.4%)	5(1.3%)

4.6.3 Distribution of Cultural Diversity

Table 4.13 shows a comprehensive overview of cultural diversity within the surveyed group across various categories. First off, when it comes to nationality diversity, only 0.8% of respondents are not Malaysian, with the vast majority (99.2%) being Malaysian. Regarding linguistic diversity, the research shows that respondents primarily use English (43.4%) and Malay (55%) among themselves. The percentage of Indian language speakers in this dataset is 1.3%, whereas the percentages for Chinese and other languages are negligible or absent.

In terms of religious diversity, the study indicates that a significant majority of respondents (91.4%) practice Islam, with smaller percentages of respondents adhering to Christianity (2.4%), Hinduism (4.3%), Buddhism (1.1%), and other faiths (0.8%). The population under study exhibits a notable degree of ethnic diversity, with the majority of respondents being Malays (90.3%), followed by smaller percentages of Chinese (3.2%), Indians (4.6%), and other ethnic groups (1.9%). Table 4.13 essentially depicts the surface-level distribution of cultural variety by outlining the percentages of the surveyed cohort that fall into each of the following categories: nationality, language preference, religious affiliation, and ethnic background.

Table 4.13 Distribution of Cultural Diversity at the Surface Level

Diversity	Statement				
Nationality Diversity	Malaysian			Non- Malaysian	
Frequency	368 (99.2 %)			3 (0.8 %)	
Linguistic Diversity	Malay	Chinese	Indian	English	Other
Frequency	204(55%)	0(0%)	5(1.3%)	161(43.4%)	1(0.3%)
Religious Diversity	Islam	Christianity	Hinduism	Buddhism	Other
Frequency	339(91.4%)	9(2.4%)	16(4.3%)	4(1.1%)	3(0.8%)
Ethnic Diversity	Malay	Chinese	Indian	Other	
Frequency	335(90.3%)	12(3.2%)	17(4.6%)	7(1.9%)	

4.6.4 Team Diversity

The results of the current study in Table 4.14 presents an intricate view of diversity within a team across several dimensions. The information supplied demonstrates a number of characteristics of diversity in an environment, such as diversity in geography, time zones, working styles (both before and after COVID-19), and diversity in digital media, ICT experience, team size, and team tenure. Approximately 90% of the participants are from the same geographic location, while the remaining 10% represent diverse regions. Since 100% of the responders are in the same time zone, there is less of a time zone difference.

In terms of working styles, during COVID-19, 29.9% of workers worked virtually, while a sizable majority (70.1%) worked in hybrid mode. Following COVID-19, hybrid work is still common (49.9%), followed by traditional work (43.1%) and working virtually alone (7%). When it comes to the diversity of digital media, the most frequently used type is multimedia (54.7%), which is followed by text-based (23.5%), audio-based (18.6%), and video-based (3.2%).

Experience in ICT shows a fairly distributed diversity, with the highest frequency in the 5-10 years range (30.7%), followed closely by 11-15 years (28.8%), and decreasing thereafter. Team size varies, with the majority of teams having fewer than 20 members (33.2% fewer than 10, and 31% between 11-20). Team tenure also varies, with the highest frequency (55%) being teams with a tenure of 18 months and above.

Overall, this data emphasises how diverse things might be in the given setting, taking into account different aspects including organisational, technological, geographic, and historical elements. Collaboration and effectiveness inside teams or organisations can be greatly impacted by an understanding of and ability to manage such variety. Table 4.14 explains the diversity factors from different aspects.

Table 4.14 Team Diversity

Diversity	Statement				
Geographical Diversity	Same Region		Different Regions		
Frequency	334(90%)		37(10%)		
Time Zones Diversity	Same Time Zone		Different Time Zones		
Frequency	371(100%)		-		
Methods of working (During COVID-19)	Traditional Work		Virtual Work		Both: Hybrid Work
Frequency	-		111(29.9%)		260 (70.1%)
Methods of working (After COVID-19)	Traditional Work		Virtual Work		Both: Hybrid Work
Frequency	160(43.1%)		26(7%)		185(49.9%)
Digital Media Diversity	Text-based media	Audio-based media	Video-based media	Multimedia-based media	
Frequency	87(23.5%)	69(18.6%)	12(3.2%)	203(54.7%)	
Experience in ICT Diversity	Below 5	5-10	11-15	16-20	21 or above
Frequency	43(11.6%)	114(30.7%)	107(28.8%)	67(18.1%)	40(10.8%)
Team Size	Fewer than 10	11-20	21-30	31-40	41 or above
Frequency	123(33.2%)	115(31%)	65(17.5%)	31(8.4%)	37(10%)
Team Tenure	Fewer than 3 months	3-6 months	6-12 months	12 -18 months	18 months and above
Frequency	38(10.2%)	33(8.9%)	51(13.7%)	45(12.1%)	204(55%)

4.6.5 Descriptive Analysis of the Study Variables

Descriptive analysis results in Table 4.15 provides a descriptive analysis of various study variables, each identified by a code. The information comprises the number of observations (N), the recorded minimum and maximum values, the mean and standard deviation for each variable for a sample of 371 individuals, and other pertinent information. The measured variables are as follows: the mean score for Trust (Tr) is 4.1267; the mean score for Relation Building (RB) is 4.1101; the mean for Communication (Com) is 4.0889; the mean for Cohesion (Coh) is 4.0728; the mean for Media Richness (MR) is 4.0424; the mean for Virtual Team Performance (VTP) is 4.0027; the mean for Virtual Leadership (VL) is 4.0018; and the mean for Knowledge Sharing (K.Sh) is 3.9654. These statistics offer an overview of the central tendencies and variability within each measured aspect among the study participants. Table 4.15 shows a descriptive analysis of the study variables.

Table 4.15 Descriptive Analysis of the Study Variables

Variables	Code	N	Minimum	Maximum	Mean	Std. Deviation
Trust	Tr	371	2.17	5.00	4.1267	.58044
Relation Building	RB	371	2.83	5.00	4.1101	.55231
Communication	Com	371	2.60	5.00	4.0889	.56756
Cohesion	Coh	371	2.00	5.00	4.0728	.60468
Media Richness	MR	371	2.43	5.00	4.0424	.57342
Virtual Team Performance	VTP	371	1.88	5.00	4.0027	.57016
Virtual Leadership	VL	371	2.67	5.00	4.0018	.53496
Knowledge Sharing	K.Sh	371	2.00	5.00	3.9654	.55771

4.7 EXPLORATORY FACTOR ANALYSIS

Factor analysis (FA) is a method that delves into multiple variables to understand their dimensions. For example, it assists in identifying whether many scales have the same underlying dimension. FA tool in SPSS is flexible, providing many methods for rotating and extracting factors (Kline, 2016). Furthermore, FA is the most well-known and established statistical technique for examining relationships between observed and underlying variables. By using this technique to analyse data, scientists examine the covariance of a group of observed variables to provide information about their hidden latent constructs, or factors (Byrne, 2010).

When researchers want to find coherent subsets within a single set of variables that show some degree of independence from one another, they use statistical techniques like Principal Components Analysis (PCA) and FA (Tabachnick & Fidell, 2013). The four main focuses of FA are establishing the unit of analysis, completing data reduction or summarization, choosing variables, and combining the results of FA with other multivariate techniques (Hair Jr *et al.*, 2014).

FA comprises two main types; EFA and CFA (Kline, 2016; Tabachnick & Fidell, 2013; Byrne, 2010; Pallant, 2010). Their method for figuring out how many components there are is one area where they diverge. EFA allows for the exploration of several solutions, ranging from one indicator to the maximum, without requiring the number of components to be specified in advance. A specific number of factors can be specified for analysis in various EFA methods. On the other hand, CFA provides a specific model to test against the data but requires that the precise number of variables be predetermined (Kline, 2016). When conducting research, EFA is frequently used to investigate relationships between variables. Conversely, CFA is a more complex and advanced collection of techniques that are applied in subsequent phases of research to support specific theories or hypotheses about the structure underlying a group of variables (Pallant, 2010). The goal of EFA is to find correlated variables and cluster them together. Regardless of whether the variables were chosen with certain underlying processes in mind at the outset. It is usually carried out in the

early phases of research as a means of combining variables and developing theories about possible underlying processes (Tabachnick & Fidell, 2013).

Furthermore, EFA is designed to be applied in situations in which relationships between latent and observable variables are unclear or unestablished. The exploratory aspect of this method's operation aims to determine the kind and strength of the relationships between the variables that are observed and the factors that underlie them. Finding the fewest factors required to explain the correlations between the observable variables is usually the aim (Byrne, 2010). Three main steps are involved in the execution of FA (Pallant, 2010), and these are the processes that the current study has followed:

4.7.1 Assessment of the Suitability of the Data for Factor Analysis

There are two main factors to take into account when determining whether a dataset is suitable for factor analysis: the sample size and the level of correlation between the variables or items in the dataset (Pallant, 2010). The following illustrates how the right sample size for the current study was determined using the variable correlations.

4.7.1.1 Sample Size

While there is disagreement among authors about the ideal sample size, the general consensus is that larger samples are preferable. The dependability of the correlation coefficients between variables tends to decrease with smaller samples, showing higher variability between samples. Small dataset-derived factors do not generalise as well as bigger sample-derived factors (Pallant, 2010).

In designing a study to unveil factor structure, researchers usually aim for a minimum of five variables for each intended factor. Concerning sample size, ensure there are more observations than variables, and aim to maximize the number of observations per variable, ideally achieving a ratio of 5 observations for each variable (Hair Jr *et al.*, 2014). Based on this criterion, the current study used 48 variables in the

survey form to test the research model, hence, the total sample size is $n = 240$ (48×5). Accordingly, 371 samples were collected, which exceeds the required sample size.

An additional technique to gauge sample adequacy is Kaiser-Meyer-Olkin (KMO). For a dependable factor analysis, KMO index, which ranges from 0 to 1, should preferably equal or surpass .6; this value indicates how suitable the dataset is for factor analysis. When KMO value is closer to 1, it suggests that the variables in the dataset are sufficiently connected to move forward with FA (Pallant, 2010). Using this methodology, KMO measure of sample adequacy for the current investigation is shown in the table below with a value of .965. A KMO value of .965 in this instance suggests that the dataset is very suitable for factor analysis.

4.7.1.2 Association among the Variables

The second consideration pertains to the strength of correlations among the items. To review the correlation matrix and suggest looking closely at coefficients higher than 0.3, FA may not be appropriate if there are few correlations higher than this cut-off. Furthermore, Bartlett's test of sphericity (Bartlett, 1954) is one of the statistical indicators that SPSS generates to assess the factorability of data; for FA to be considered suitable, Bartlett's test must demonstrate significance ($p < .05$) (Pallant, 2010). A method for evaluating factor analysis's applicability is to examine the correlation matrix as a whole. The Bartlett test of sphericity, which looks for correlations between variables, is one such technique. According to Hair Jr *et al.* (2014), this test establishes the statistical significance by determining whether the correlation matrix demonstrates significant relationships among particular variables.

In the current study, Table 4-16 displays the outcomes of Bartlett's Test of Sphericity, a test examining if correlations between variables differ significantly from zero, implying interdependence among variables. The "Approx. Chi-Square" value of 21020.921 represents the computed test statistic, with "Df" indicating 1128 degrees of freedom. The "Sig." value of .000 signifies a very low p-value, suggesting strong evidence against the assumption that correlations are zero; instead, it supports the presence of statistically significant correlations among variables, indicating suitability

for FA (Pallant, 2010). Table 4.16 shows KMO and Bartlett's Test KMO and Bartlett's Test.

Table 4.16 KMO and Bartlett's Test KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.965
Bartlett's Test of Sphericity	Approx. Chi-Square	21020.921
	Df	1128
	Sig.	.000

4.7.2 Factor Extraction

Finding the fewest factors required to accurately depict the relationships between variables is the goal of factor extraction. There are several ways to figure out how many underlying elements there are. primary components, primary factors, image factoring, Maximum Likelihood (ML) factoring, alpha factoring, ULS, GLS, and principal components are among the frequently employed techniques (Pallant, 2010; Tabachnick & Fidell, 2013). PCA is the most often used approach, and it is the approach that is used in this study. Principal components analysis, often known as component analysis, looks at variation as a whole and finds components that account for small amounts of unique variance, sometimes even error variance (Hair Jr *et al.*, 2014).

There are common criteria for the number of factors to extract which are the Latent root criterion, a priori criterion, scree test criterion, and percentage of variance criterion (Hair Jr *et al.*, 2014; Pallant, 2010; Tabachnick & Fidell, 2013). The current study will look at various strategies and select the approaches used in this investigation.

4.7.2.1 Latent Root Criterion (Kaiser's Criterion)

The latent root criteria is a widely used technique that is easily used to both component analysis and common factor analysis. The fundamental idea behind this criterion is that for a component to have any interpretive significance, it must be able to account for the variance of a minimum of one variable. Every variable in component analysis adds a value of 1 to the overall eigenvalue. Accordingly, factors are only considered significant if they have latent roots or eigenvalues greater than 1; factors that have latent roots less than 1 are regarded as insignificant and are not given any more weight (Hair Jr *et al.*, 2014).

Moreover, Kaiser's criterion, sometimes known as the eigenvalue rule, is a commonly used technique. According to these criteria, only factors that have an eigenvalue of at least 1.0 are retained for further investigation. A factor's eigenvalue indicates the percentage of the overall variation that that particular component accounts for (Pallant, 2010). As a result, the components with latent roots greater than one—seven in the current study—will be kept, while the factors with latent roots less than one will be disregarded. Table 4.17 demonstrates factor extraction according to latent root criterion.

Table 4.17 Factor Extraction According to Latent Root Criterion

Initial Eigenvalues			
Component	Total	% of Variance	Cumulative %
1	27.455	57.199	57.199
2	2.618	5.453	62.652
3	2.133	4.445	67.097
4	1.583	3.299	70.396
5	1.300	2.707	73.103
6	1.136	2.367	75.470
7	1.035	2.156	77.625
8	.847	1.764	79.389

4.7.2.2 A Priori Criterion

Although simple, the a priori criterion makes sense in some circumstances. Prior to performing the factor analysis, the researcher must decide how many factors to extract. This method helps test a predetermined theory or hypothesis about the factor count, by telling the computer to stop analysing after extracting the given number of factors. It is also acceptable when a researcher replicates the findings of another, with the goal of extracting the same amount of previously identified components (Hair Jr *et al.*, 2014).

The present study model's factors were developed through previous relevant studies, so the number of extracted factors was determined using the Priori Criterion method. This resulted in the identification of 8 eight factors, which are trust, cohesion, relation building, communication, virtual leadership, knowledge sharing, media richness, and virtual team performance. However, the results of the EFA suggest that the first variable, trust, and the second variable, cohesion, belong to one factor. Hence, the variables in the study model become 7 instead of 8, as will be shown in the section pertaining to the results of the exploratory factor analysis.

4.7.2.3 Scree Test Criterion (Catell's Scree Test)

The Scree Test Criterion involves plotting the latent roots against the order of factor extraction and assessing the curve's shape to determine a cutoff point. The plot shows a steep fall with the first factor at first, then a gradual change to a nearly horizontal line. According to Hair Jr *et al.* (2014), the point at which the curve starts to level out is thought to represent the greatest number of components that can be extracted. The Scree Test Criterion, also known as Catell's Scree test, involves graphing the eigenvalues of factors and analysing the curve to find the point at which the curve changes direction and becomes flat. Retaining all components above the "elbow" or plot break is Catell's recommendation because these factors mostly explain the variance in the dataset (Pallant, 2010).

Plotting the factor eigenvalues in descending order along the horizontal axis is done, and the eigenvalue is represented by the vertical axis. To find the ideal number of factors, this graphical representation—also referred to as a scree plot—is frequently used in both the first and second runs of PCA or factor analysis. IBM SPSS can be used to create the scree plot (Tabachnick & Fidell, 2013). In the current study, it is the first seven factors that have been retained, as the following diagram 4-5 shows that at the seventh factor, the curve begins to take the shape of a straight line (Inflection point). Figure 4.5 shows the scree test criterion.

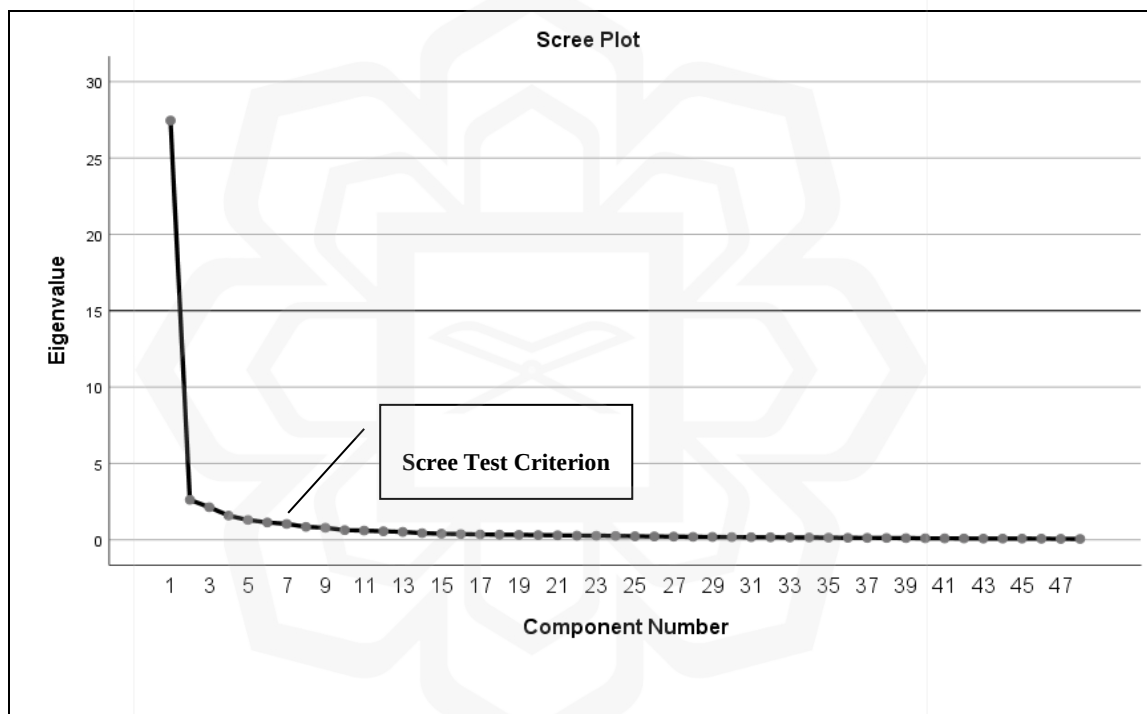


Figure 4.5 Scree Test Criterion

4.7.2.4 Percentage of Variance Criterion

The percentage of variance criterion utilizes a method centered on attaining a defined cumulative percentage of the overall variance extracted through successive factors. By making sure the resulting factors account for a predefined level of variance, the aim is to ensure the practical importance of the factors. There isn't a single criterion that

applies to all applications. A modified variant of this criterion involves choosing enough components for each variable to reach a predefined communality (Hair Jr *et al.*, 2014).

In the natural sciences, factoring is usually done until the extracted factors account for at least 95% of the variance or until the last factor accounts for less than 5% of the variance. In contrast, it is common in the social sciences—where data precision is frequently lower—to judge a solution adequate if it explains 60% of the total variance (Hair Jr *et al.*, 2014). Based on this criterion, the percentage of variance criterion in the current study for the seven factors adopted in the results of the EFA was 77.625%, as shown in the results of EFA, which exceeds the threshold in the social sciences of 60%.

4.7.3 Factor Rotation and Interpretation

The next stage is factor interpretation, which is aided by a procedure known as 'rotation' of the factors. This does not modify the fundamental solution, but rather rearranges the loading pattern to improve interpretability. Within SPSS, the instrument illustrates how variables cluster together, but it does not automatically assign labels or interpretations to each factor (Pallant, 2010).

There are two main ways to rotate, which result in factor solutions that are either oblique (correlated) or orthogonal (independent). SPSS provides a range of strategies (oblique: Direct Oblimin, Promax; orthogonal: Varimax, Quartimax, Equamax) that fall under the two primary rotational approaches (Pallant, 2010). To help researchers select a particular orthogonal or oblique rotational approach, no set criteria exist. The rotational strategy provided by the computer programme is usually chosen by researchers. Although VARIMAX rotation is the default in many programmes, there are several significant rotational methods that are easily available (Hair Jr *et al.*, 2014). The widely employed orthogonal technique, known as the Varimax method, aims to reduce the count of variables with substantial loadings on each factor. This method has been utilized in the current study.

4.7.4 Assessing Factor Loadings and Communalities of the Variables

Although factor loadings greater than ± 0.50 are usually thought to be required for practical significance, loadings between ± 0.30 and ± 0.40 are thought to be at least minimally acceptable. Furthermore, a smaller loading suffices when dealing with a larger sample size or a greater number of variables under analysis (Hair Jr *et al.*, 2014). Table 4.18 shows the required loading factor compared to the sample size.

Table 4.18 Guidelines for Identifying Significant Factor Loadings

Factor Loading	Sample Size Needed for Significance (0.05)
0.30	350
0.35	250
0.40	200
0.45	150
0.50	120
0.55	100
0.60	85
0.65	70
0.70	60
0.75	50

Source: (Hair Jr *et al.*, 2014)

Based on these criteria, and since the sample size reached 371 in the current study, the factor loading with a value of 0.3 or greater has been taken into consideration in the current study. Moreover, for inclusion in the analysis, it is generally recommended that variables have communalities exceeding 0.50 (Hair Jr *et al.*, 2014). Therefore, variables that have a community of 0.50 or more have been included in the analysis in the current study. Based on the previous criteria (Factor Loading $\geq \pm 0.3$; Communalities > 0.5 ; Cronbach's $\alpha > 0.7$) and the assumptions discussed (KMO > 0.6 ; Bartlett's test should show significance ($p < .05$)), the results of the EFA were as follows.

4.7.5 Results of EFA

The Extraction and Rotation Methods show that Varimax rotation with Kaiser normalisation was used for improved interpretability and Principal Component Analysis was used for factor extraction. The stability and dependability of the extracted elements are highlighted by the convergence of the rotation process in the eight components. To sum up, the EFA results confirm the reliability and validity of the produced components and scales by matching them with the previously stated criteria and assumptions. The table below displays the findings of the exploratory factor analysis, which are explained in the following.

The findings of the EFA show that factor loading values indicate the direction and intensity of the associations between specific items and the factors that have been identified. The factor loading values in this analysis range from 0.425 to 0.809 for different items. Using $\geq \pm 0.3$ as a cutoff point (Hair Jr *et al.*, 2014), every item has factor loadings above this cutoff, demonstrating a significant contribution from every item to its own factor. The degree to which each item corresponds with the underlying constructs found through FA is shown by these values. Respect for the ± 0.3 criterion implies that every item contributes to and defines the factors that have been found, which strengthens the strength of the factor structure that the study has shown.

The percentage of each variable's variance that can be accounted for by the extracted factors is represented by the communality values, as seen in the results of the exploratory factor analysis. The commonality values for the variables in the supplied analysis range from 0.601 to 0.868. These numbers indicate how much each variable is explained by the factors that have been found. Based on Hair Jr *et al.* (2014), the threshold of 0.5 was met by all variables in the study, meaning that their communality values exceeded this requirement. This suggests that more than half of the variance for each variable can be explained by the extracted factors taken together, supporting the dependability of the FA results and demonstrating a strong representation of the underlying constructs.

The internal consistency reliability of the scales that are created from the identified factors is measured by Cronbach's Alpha values, which are displayed in the findings of the exploratory factor analysis. The Cronbach's Alpha scores for the various scales in the analysis given range from 0.929 to 0.964. These results all exceed the generally recognised cutoff point of 0.7 (Hair Jr *et al.*, 2014; Pallant, 2010), demonstrating a high level of dependability for the scales created using the variables. This implies that every item on each scale measures the same underlying construct consistently, which raises confidence in the validity of the factors that were found and the subsequent scales that were created from the exploratory factor analysis.

Eigenvalues play a critical role in exploratory factor analysis, indicating the amount of variance explained by each factor. In the presented results, the initial eigenvalues for the first eight components range from 27.455 to 0.847, with the eighth factor falling below the commonly used criterion of 1. (Hair Jr *et al.*, 2014;. Pallant, 2010). Following established guidelines, factors with eigenvalues exceeding 1 are deemed meaningful and retained for further interpretation. In this case, the analysis would exclude the eighth factor as it does not meet the eigenvalue criterion. The decision to exclude this factor ensures that only those factors with substantial explanatory power, as reflected in their eigenvalues, are considered in the subsequent analysis.

The "Percentage of Variance" and "Cumulative Percentage" values in the EFA results provide insights into how much variability is accounted for by each factor and the cumulative contribution of all factors. The first eigenvalues and matching variance percentages are given in the results that are shown. For example, the entire variation is explained by the first factor by 57.199%, the second factor by 5.453%, and so on. By taking each factor one at a time, the cumulative percentage of variance explained is displayed in the "Cumulative %" column. For instance, the sum of the first two components' explanations of 62.652% of the variance is increased when more factors are included. In the social sciences, the variance that must above the 60% criterion is explained by the seven factors that are part of this study, accounting for 77.625% of the variance (Hair Jr *et al.*, 2014).

However, there is only one item (K.Sh5) in the eighth component, with a factor loading of 0.722 and a commonality of 0.601. The eighth element that the FA results unveiled cannot be represented by a single item, and as this factor lacked theoretical backing, it will not be included in the current investigation. Table 4.19 displays a summary of the results of the EFA within the conditions and criteria mentioned previously.

Table 4.19 EFA Results of Study Component

Rotated Component Matrix ^a										Communality	Cronbach's Alpha
	items	Component									
		1	2	3	4	5	6	7	8		
Trust and Cohesion	Tr1	.740								.777	0.964
	Tr2	.715								.861	
	Tr3	.741								.835	
	Tr4	.739								.850	
	Tr5	.586								.765	
	Tr6	.627								.809	
	Co1	.645								.805	
	Co2	.654								.820	
	Co3	.636								.752	
	Co4	.617								.779	
Relation Building	RB1				.650					.733	0.946
	RB2				.716					.827	
	RB3				.552					.729	
	RB4				.616					.787	
	RB5				.736					.868	
	RB6				.691					.830	
Communication	Com1						.641			.733	0.944
	Com2						.693			.835	
	Com3						.664			.835	
	Com4						.691			.826	
	Com5						.657			.828	
Virtual Leadership	VL1					.629				.767	0.929
	VL2					.748				.814	
	VL3					.678				.755	
	VL4					.504				.654	
	VL5					.701				.803	
	VL6					.702				.826	
R _i	MR1			.779						.807	0.938

Rotated Component Matrix ^a										Communality	Cronbach's Alpha
	items	Component									
		1	2	3	4	5	6	7	8		
	MR2			.795						.800	0.937
	MR3			.809						.835	
	MR4			.765						.783	
	MR5			.776						.804	
	MR6			.661						.787	
	MR7			.703						.733	
Knowledge Sharing	KSh1							.512		.795	0.937
	KSh2							.425		.804	
	KSh3							.467		.826	
	KSh4							.482		.776	
	KSh6							.507		.765	
	KSh5								.722	.601	-
Virtual Team Performance	VTP1		.657							.799	0.957
	VTP2		.666							.762	
	VTP3		.739							.817	
	VTP4		.722							.838	
	VTP5		.705							.807	
	VTP6		.681							.829	
	VTP7		.692							.814	
	VTP8		.658							.822	
Initial Eigenvalues		27.455	2.618	2.133	1.583	1.300	1.136	1.035	0.847		
% of Variance		57.199 %	5.453 %	4.445 %	3.299 %	2.707 %	2.367 %	2.156 %	1.764 %		
Cumulative %		57.199 %	62.652 %	67.097 %	70.396 %	73.103 %	75.470 %	77.625 %	79.389 %		
Extraction Method: Principal Component Analysis.											
Rotation Method: Varimax with Kaiser Normalization. ^a											
a. Rotation converged in 8 iterations.											

4.8 CONFIRMATORY FACTOR ANALYSIS OF SOCIAL PRESENCE

CFA is a frequently encountered concept in the realm of structural equation modeling. According to Hair Jr *et al.* (2014, p602), CFA is “a way of testing how well measured variables represent a smaller number of constructs”. According to Schumacker and

Lomax (2010), the contemporary usage of the term CFA is influenced, in part, by the earlier contributions of Howe (1955), Anderson and Rubin (1956), and Lawley (1958). The method of CFA was further developed in the 1960s by Karl Jöreskog, specifically to assess whether a defined construct could be validated through a set of items. In a way, CFA serves as a tool that allows us to either validate or invalidate our pre-established theory. We do a confirmatory assessment of our measurement theory using CFA. This theory describes how constructs inside a theoretical model are rationally and methodically depicted by measured variables. Then, to fully establish a SEM model, the measurement theory can be combined with a structural theory (Hair Jr *et al.* 2014).

Although there are some parallels, exploratory and CFA differ in a number of ways. In CFA, the number of factors and the particular component that each variable will be linked to must be predetermined by the researcher for each set of variables. Because of this, the approach does not assign variables to factors on its own; rather, before any analytical results are produced, the researcher makes this decision in light of the underlying theory (Hair Jr *et al.* 2014).

Thus, in contrast to EFA, in which the number of factors and loadings are determined by the statistical method, the statistical outcomes of CFA evaluate the extent to which our predetermined theoretical model corresponds with the empirical data (Hair Jr *et al.* 2014). When there is uncertainty or ambiguity regarding the relationships between the latent and observable variables, exploratory factor analysis, or EFA, is appropriate. Confirmatory component analysis (CFA), on the other hand, works best when the researcher has some knowledge of the latent variable structure. The researcher develops a priori correlations between observable measurements and underlying factors based on theory, empirical study, or both, and then puts this theoretical framework through statistical testing (Byrne, 2016).

In CFA, the researcher determines which observable variables are used to measure each factor, outlines a particular number of factors, and finds connections between these factors. On the other hand, in an EFA, the number of factors is counted, possible relationships between the factors are examined, and the most useful

observable variables for measuring each component are identified (Schumacker & Lomax, 2010).

The CFA (measurement model), and structural equation modeling (structural model) should go through several stages: Model Specification, Model Identification, Model Estimation, Model Testing, and Model Modification (Schumacker & Lomax, 2010), therefore, the current study will follow these stages to test both models; the measurement model and the structural model.

4.8.1 Model Specification

As with multiple regression and route models, defining the model is a crucial first step in investigating a confirmatory factor model. It is possible to propose many relationships between a group of variables, which will result in the estimation of different parameters. As a result, several factor models can be developed based on variously proposed relationships between the factors and the observed variables (Schumacker & Lomax, 2010).

At this stage, the researcher converts the concept's theoretical meaning into a set of particular measurable variables. The researcher must carefully consider how each separate construct will combine to form an all-encompassing measurement model (Hair Jr *et al.*, 2014). Using all relevant theoretical underpinnings, research findings, and data to build a theoretical model is known as model specification. It includes figuring out every relationship and parameter in the model that the researcher is interested in (Schumacker & Lomax, 2010).

In order to define the social presence model, recent studies have examined social presence as an important factor in the context of virtual teams. Research shows that social presence in virtual teams takes several forms, such as communication, cohesiveness, trust, and relationship building. Social components including cohesiveness, trust, and connection building are critical to the effectiveness of virtual teams (Lin *et al.*, 2008). Additionally, it is clear that communication is essential for

virtual team members as it is the living force that makes them more visible in social media.

Consequently, improving social presence becomes one of networked communication systems' main goals (Oh *et al.*, 2018). Because virtual teams rely on virtual platforms for communication among team members to support their feeling of trust, coherence, and relationship building, it's crucial to emphasise that social presence in traditional teams is different from that in virtual teams. Based on earlier research. Figure 4.6 represents the model parameters for the social presence components.

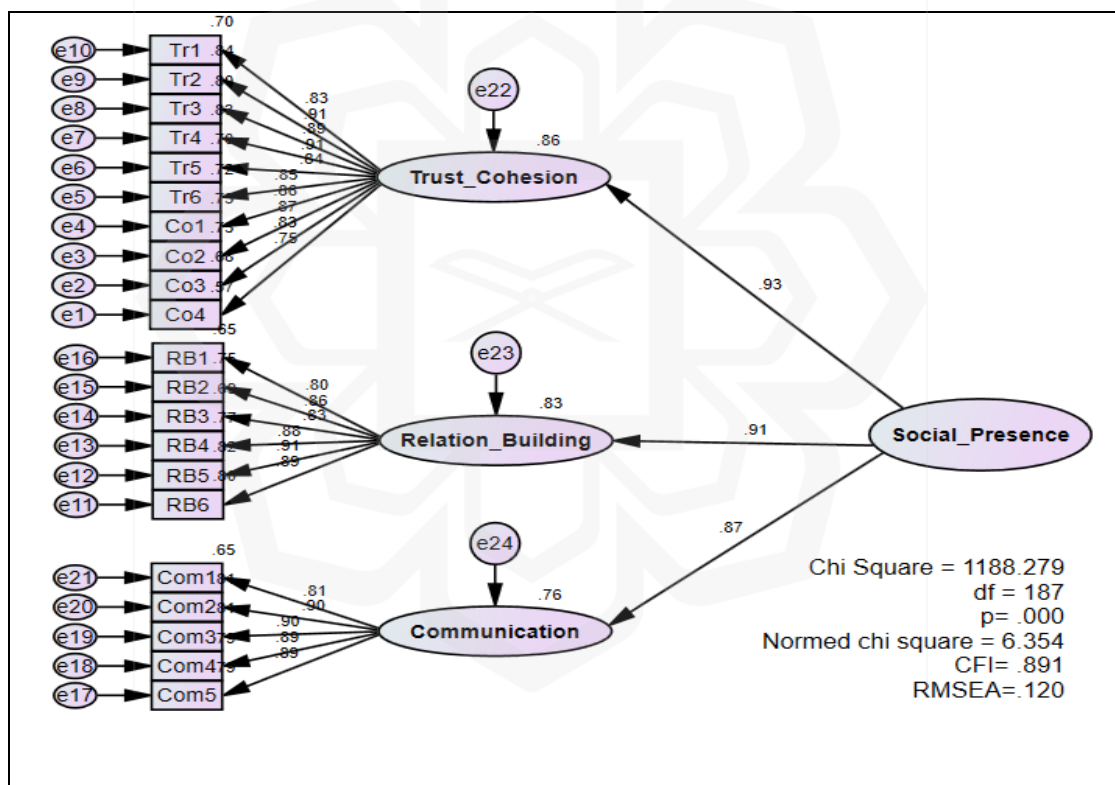


Figure 4.6 Model Specification of SP Components (Second Order)

4.8.2 Model Identification

Model identification refers to “deciding whether a set of unique parameter estimates can be computed for the regression equation” (Schumacker & Lomax, 2010, p131).

Identification is the process of evaluating if enough data is available to determine the solution to a system of structural equations (Hair Jr *et al.*, 2014). Prior to estimating parameters in structural equation modelling, the identification problem must be resolved.

It is necessary to designate each possible parameter in the model as either a constrained, fixed, or free parameter. An unknown parameter that needs to be estimated is referred to as a free parameter. A fixed parameter is one that is predefined and cannot be estimated; it is usually set at a given value, usually either 0 or 1. According to Schumacker and Lomax (2010), a restricted parameter is an unknown parameter that is required to equal one or more other parameters.

Three stages of model identification have been used traditionally, and they are based on the level of information in the sample variance-covariance matrix *S* that is necessary for the unique estimation of the model's parameters. The following is an outline of the three stages of model identification:

- 1) A model is under-identified (or not identified) if one or more parameters may not be uniquely determined because there is not enough information in the matrix *S* (Schumacker & Lomax, 2010). When there are more parameters to estimate than distinct indicator variable variances and covariances in the observed variance/covariance matrix, the model is referred to as under identified or unidentified (Hair Jr *et al.*, 2014).
- 2) A model is just-identified if all of the parameters are uniquely determined because there is just enough information in the matrix *S* (Schumacker & Lomax, 2010). Perfectly sufficient Degrees of Freedom (DF) to estimate all free parameters characterise Just-Identified models. The CFA correctly reproduces the sample covariance matrix in these models since all relevant information is used. According to Hair Jr *et al.* (2014), the recently discovered models show an ideal fit.
- 3) A model is over-identified when there is more than one way of estimating a parameter (or parameters) because there is more than enough information

in the matrix S (Schumacker & Lomax, 2010). Over identified models have more distinct covariance and variance terms than the parameters that need to be estimated. As a result, a solution with positive DF and a matching Chi-Square (χ^2) Goodness-Of-Fit (GOF) value can be found for any measurement model. A higher number of measured objects reinforces the over identified situation. Thus, having an over identified model and constructs is the goal when using CFA and SEM (Hair Jr *et al.*, 2014).

A model is deemed identified if it is either over-identified or exactly identified. Negative DF for the model suggests that the reliability of parameter estimations is doubtful in the situation of under-identification. Nevertheless, the model may be identified if more restrictions are placed on it, leading to DF that is either equal to or greater than 0 (a positive value) (Schumacker & Lomax, 2010). A model is established, model parameters are computed with sample data, and the estimated population covariance matrix is produced using the model's parameters. It is important to remember, though, that only models that are categorised as identifiable are eligible for estimation. When there is just one numerical solution for every parameter in the model, it is said to be identified (Tabachnick & Fidell, 2013).

In the current study, the results of Amos Software in the CFA Stage indicate that the number of distinct sample moments is 231, and the number of distinct parameters to be estimated is 44, hence, $DF = 231 - 44 = 187$. Therefore, the model is over-identified, and the model of the current study could be estimated.

4.8.3 Model Estimation

To properly start the modelling process, it is essential to have beginning estimates (start values) for the parameters during the model estimating phase. The fewer iterations required to find a solution, the closer these initial estimations are to the real start values. There are numerous techniques for choosing suitable beginning values (Tabachnick & Fidell, 2013). Several methods, such as ML, Generalised Least Squares (GLS), and Unweighted Least Squares (ULS), can be used to estimate

parameters. The current study presents our statistical estimations of the free parameters through an analysis of our confirmatory factor model utilizing ML estimation with a standardized solution (Schumacker & Lomax, 2010).

4.8.4 Model Testing

Aligning the sample variance-covariance data with the chosen model is an essential step in estimating confirmatory factor models. A well-fitting model signifies that the sample data supports the model. On the other hand, a poor model fit indicates that the sample data do not support the model, which is why researchers usually modify the model to achieve a better match (Schumacker & Lomax, 2010). The fit of the data to the model must be assessed by the researcher once parameter estimates for a chosen SEM model have been obtained. To put it simply, this is determining how well the collected sample data matches the theoretical model. Two views exist regarding model fit: one is based on an extensive omnibus test that evaluates the model's overall fit, while the second examines the fit of specific model parameters (Schumacker & Lomax, 2010).

Following a selected model's estimation, model fit is a process that compares the theoretical model to empirical observations by measuring the degree to which the estimated covariance matrix, which represents the theory, and the observed covariance matrix, which represents reality, agree. If there were a perfect theory, these matrices would match exactly. GOF metrics use mathematical comparisons to assess the difference between these matrices. The degree to which the values of the two matrices match indicates how well the model fits the data (Hair Jr *et al.*, 2014). The degree to which the sample variance-covariance data match the structural equation model is measured by model fit. χ^2 , the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), and the Root-Mean-Square Residual Index (RMR) are often used metrics for evaluating model fit. Moreover, the likelihood of substitute models with similar fit increases with model complexity. As such, it's best to use more than one fit index when assessing GOF of a model. According to Hair Jr *et al.* (2014), this should include the χ^2 value and DF that correlate with it, one absolute fit index (GFI,

RMSEA, or SRMR), one incremental fit index (CFI or TLI), one GOF index (GFI, CFI, TLI), and one badness-of-fit index (RMSEA, SRMR). This is a minimal set of fit statistics that should be provided whenever it is practical to do so. Three approximation fit indices and a model test statistic are included in this set: 1. Use the p-value and DF for χ^2 model. 2. The 90% confidence interval for the Root Mean Square Error of Approximation (RMSEA). 3. CFI 4. Root Mean Square Residual Standardised (SRMR) (Kline, 2016).

GOF which measures the agreement between the observed and estimated covariance matrices, evaluates how well the chosen model replicates the observed covariance matrix among the indicator items. Absolute measurements, incremental measures, and parsimony fit measures are the three broad categories into which the GOF measures are divided (Hair Jr *et al.*, 2014; Byrne, 2016; Schumacker & Lomax, 2010; Kline, 2016).

4.8.4.1 Absolute Fit Indices

Absolute fit indices offer a straightforward evaluation of the extent to which the model defined by the researcher accurately reproduces the observed data. These indices offer a basic evaluation of the degree to which the researcher's theory and the sample data agree. Remarkably, they don't expressly contrast the given model's GOF with any other model. Rather, every model is evaluated on its own, without being directly compared to other models (Hair Jr *et al.*, 2014). According to Kline (2016), absolute fit indices evaluate how well an established model explains the observed data. Here, the study goes over the most widely used Indexes:

4.8.4.1.1 Chi-Square GOF

By analysing the difference between the observed and estimated covariance matrices, χ^2 test is essential for determining GOF of any SEM model. According to Hair Jr. *et al.* (2014), this statistical test particularly evaluates the variation between matrices in the context of SEM. For testing the theoretical model, χ^2 test is the only statistical test

of significance (Schumacker & Lomax, 2010). Chi-Square, a χ^2 difference statistic, is used to evaluate the statistical significance of the decrease in overall fit that occurs when free parameters are eliminated during model trimming or the increase in fit that occurs when free parameters are included during model construction (Kline, 2016).

4.8.4.1.2 Degrees of Freedom (DF)

DF indicates the quantity of mathematical information accessible for estimating model parameters (Hair Jr *et al.*, 2014).

4.8.4.1.3 Normed Chi-Square

Normed Chi-Square is a straightforward GOF measure calculated as the ratio of χ^2 to DF in a model. In general, models with χ^2 :df ratios around 3:1 or lower are linked with a better fit (Hair Jr *et al.*, 2014).

4.8.4.1.4 Goodness-of-Fit Index (GFI)

GFI was an early attempt to develop a fit statistic that is not as sensitive to sample size. This statistic is nevertheless sensitive to sample size because of the effect of non-sampling distributions even though N (sample size) is not included in the formula. GFI is based on fit guidelines rather than any particular statistical test. Better fit is indicated by higher GFI values, which range from 0 to 1. GFI values greater than .90 were typically considered to be a sign of a strong match (Hair Jr *et al.*, 2014). According to Schumacker and Lomax (2010), GFI is calculated by dividing the observed variances by the sum of squared differences between the observed and recreated matrices. This allows for scale adjustments. According to Schumacker and Lomax (2010), GFI and AGFI indices allow evaluations of the fit of a single model with diverse data or comparisons of the fit of two different models with the same data. The percentage of variance and covariance in S that are jointly explained by Σ is measured by GFI (Byrne, 2016).

4.8.4.1.5 Root Mean Square Error of Approximation (RMSEA)

A popular metric called RMSEA was created to counteract the χ^2 GOF test statistic's propensity to reject models with a large sample size or a large number of observable variables. As a result, beyond the sample used for estimate, RMSEA offers a more realistic depiction of how well a model fits a population. A better fit is indicated by lower RMSEA values. Although previous studies had recommended cut-off values of .05 or .08, most recent research advises against setting an absolute RMSEA cut-off. Consequently, to allow for a more nuanced interpretation, it is desirable to state that the RMSEA falls between 0.03 and 0.08 with 95% confidence (Hair Jr *et al.*, 2014). As an absolute fit index, the RMSEA stands for a badness-of-fit statistic; a value of zero denotes an optimal outcome. Moreover, it usually "rewards" models with higher degrees of freedom. Computer output typically displays this index and its 90% confidence interval (Kline, 2016).

4.8.4.1.6 Root-Mean-Square Residual Index (RMR)

The square root of the mean-squared RMR discrepancies between the elements in matrices S and o is determined by the RMR index. Because it doesn't have a fixed acceptable cut-off, it works best when comparing how well two different models fit the same dataset (Schumacker & Lomax, 2010). Furthermore, a standardised version of RMR known as Standardised RMR is available. The Standardised Root Mean Residual (SRMR), which spans from zero to one hundred, represents the average value over all standardised residuals. This number is usually low in a well-fitting model, such as .05 or less (Byrne, 2016). As a badness-of-fit statistic, the SRMR functions as an absolute fit index. It is a standardised version of the Mean Absolute Covariance Residual's (MARC) root mean square residual (RMR). $RMR = 0$ indicates a perfect model fit, while larger values correspond to increasingly worse fits (Kline, 2016).

Based on the study of Hair Jr *et al.* (2014); Byrne (2016); Schumacker and Lomax, (2010); Kline (2016), the current study has considered Absolute Measures

such as χ^2 (Significant p-values when $(N > 250 \text{ \& } m \geq 30)$); Normed Chi-Square (< 5); RMSEA (< 0.08); RMR (< 0.05); SRMR (.08 or less); GFI (> 0.90). Table 4.20 shows the common indicators of Absolute Measures of goodness of fit with the threshold and their sources compared with the result of the initial CFA model of social presence.

Table 4.20 GOF of Absolute Measures of Social Presence

G.O.T Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected ($N > 250 \text{ \& } m \geq 30$)	1188.279 P=0.000	Yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	> 1 Over Identified	187	Yes
	χ^2/df	(Hair <i>et al.</i> , 2014)	< 5.0	6.354	No
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.017	Yes
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0402	Yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	> 0.90 .90 or .95	0.747	No
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.120	No

GOF of absolute social presence measurements is displayed in the table. The requirement for fit was met since the χ^2 statistic (CMIN) produced a significant p-value ($p=0.000$), suggesting a substantial difference between the observed and expected covariance matrices. Nevertheless, χ^2 to DF ratio (χ^2/df) was higher than the cutoff of 5.0, indicating a poor fit. A successful fit was indicated by the Root Mean Square Residual (RMR) and Standardised Root Mean Square Residual (SRMR) meeting their respective thresholds. The unsatisfactory fit was shown by GFI, which was below the acceptable value of > 0.90 . In a similar vein, a less-than-ideal fit was indicated by RMSEA exceeding the cutoff (< 0.08).

4.8.4.2 Incremental Fit Indices (Comparative Fit Indices)

In contrast to absolute fit indices, incremental fit indices evaluate the estimated model's fit in comparison to a different baseline model. A null model, which is the most popular baseline model, is one that makes the assumption that all observable variables are uncorrelated. Because the model specification lacks multitem factors and the relationships between them, it suggests that no model specification could possibly improve the model. The improvement in fit brought about by the specification of linked multi-item constructs is represented by this class of fit indices. The most used incremental fit metrics are TLI and CFI (Hair Jr *et al.*, 2014). Incremental (relative, comparative) fit indices measure how much the researcher's model fits better than a baseline model. According to Kline (2016), the independence (null) model is usually the baseline model, which postulates zero covariances between endogenous variables. Three further indices, the Tucker-Lewis Index (TLI), the Bentler-Bonett Normed Fit Index (NFI), and the Comparative Fit Index (CFI), have been presented as alternatives for evaluating different models, taking into account the significance of χ^2 in assessing the model fit of latent variable models. According to Schumacker and Lomax, (2010), these requirements usually entail contrasting a suggested model with a null model, or independence model. Here, the study goes over the most popular Indexes:

4.8.4.2.1 The Normed Fit Index (NFI)

NFI is among the initial incremental fit indices. It is computed as the ratio of the difference in the χ^2 value between the fitted model and a null model, divided by the χ^2 value for the null model. A model with a perfect fit would result in an NFI of 1, which ranges from 0 to 1. However, a disadvantage is that more complex models will always have larger index values, which could distort the evaluation of model fit (Hair Jr *et al.*, 2014). χ^2 is converted into a scale with a range of 0 (no fit) to 1.0 (perfect fit) using a metric called NFI. According to Schumacker and Lomax (2010), it is used to compare a limited model with a full model using a baseline null model.

4.8.4.2.2 The Tucker Lewis Index (TLI)

TLI shares conceptual similarities with the NFI but differs by comparing the normed chi-square values between the null and specified models, somewhat considering model complexity. Because TLI is not normed, its values can go outside of 0 or above 1. A higher TLI value denotes a better match than a model with a lower value, and models with good fit typically approach a TLI value of 1 (Hair Jr *et al.*, 2014). TLI which was first developed in 1973 by Tucker and Lewis for factor analysis, was later extended to be used in structural equation modelling. This measure is used to evaluate how well a suggested model fits into the null model or to compare other models (Schumacker & Lomax, 2010). TLI also referred to as the Non-Normed Fit Index (NNFI), is a related statistic. This index accounts for dfB in the baseline model as well as dfM in the researcher's model (Kline, 2016).

4.8.4.2.3 The Comparative Fit Index (CFI)

CFI is an incremental fit index, representing an enhanced version of NFI. Since CFI values are normed, they range from 0 to 1, with higher values denoting better fit. CFI is extensively used because of its advantageous qualities, which include relative, but not absolute, insensitivity to model complexity. CFI values greater than .90 are typically associated with models that fit well (Hair Jr *et al.*, 2014). CFI values are obtained by comparing an independent (or null) model with a hypothesised model. These values range from zero to 1.00. The degree of overall covariation in the data is measured by this statistic. A more recent guideline offers a revised cut-off value near .95, but an initial criterion of >.90 was considered indicative of a well-fitting model (Byrne, 2016). CFI is a GOF statistic that also serves as an incremental fit indicator. It is graded on a range of 0 to 1.0, where 1.0 is the ideal result. In comparison to the independent (null) model, CFI evaluates how far the researcher's model deviates from a close fit (Kline, 2016).

Based on the study of Hair Jr *et al.* (2014); Byrne (2014); Schumacker and Lomax (2010); Kline (2016), the current study has followed NFI index (>0.90); CFI (>0.90); TLI (>0.90). Table 4.21 shows the indicators of incremental measures goodness.

Table 4.21 GOF of Incremental Measures of Social Presence

G.O.T Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.878	No
	CFI	(Hair <i>et al.</i> , 2014) (Byrne, 2016)	>0.90 .90 or .95	0.891	No
	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.874	No

The table provides incremental measurements of social presence to assess the goodness-of-fit. Both CFI and TLI were below the suggested cut-off point (>0.90), indicating an inadequate fit. Likewise, NFI did not reach the designated cut-off, indicating an insufficient fit. In general, none of the incremental measures met the predetermined requirements for the appropriate degree of fit.

4.8.4.3 Parsimony Fit Indices

Parsimony Fit Indices constitute the third category of measures explicitly designed to offer insights into the optimal model among a set of competing models, taking into account both its fit and complexity. An improved fit or a more straightforward model will result in an increase in a parsimony fit metric. In this case, a model with fewer predicted parameter routes is considered simpler. The basic computation for these metrics is based on the parsimony ratio, which is defined as the fraction of DF that a model uses relative to the total number of DF that are accessible (Hair Jr *et al.*, 2014). Parsimony pertains to the count of estimated parameters needed to attain a certain level of model fit. It involves comparing an over-identified model with a restricted

model. A measure of model parsimony is also provided by the previously described AGFI measure. The Akaike Information Criterion (AIC) and the Parsimony Normed Fit Index (PNFI) are two more indices that show model parsimony (Schumacker & Lomax, 2010). Parsimony-adjusted indexes incorporate a correction or "penalty" in their calculations to account for model complexity. This penalty can also be seen as a "reward" for simplicity (Kline, 2016). Here the study reviews the most common Indexes:

4.8.4.3.1 The Adjusted Goodness-of-Fit Index (AGFI)

AGFI attempts to consider variations in model complexity by adjusting GFI through a ratio of DF used in a model to the total available degrees of freedom. More complex models are penalised by AGFI, which favours models with fewer open paths. In relation to model complexity, AGFI values are often lower than GFI values. Like GFI, AGFI depends on fit criteria rather than a particular statistical test. But compared to other indices that are less affected by sample size and model complexity, it is not as often employed (Hair Jr *et al.*, 2014). DF in a model in relation to the number of variables is taken into consideration while modifying AGFI. GFI and AGFI indices can be used to evaluate the fit of a single model using diverse data or to compare the fit of two different models with the same data (Schumacker & Lomax, 2010). The main difference between GFI and AGFI is that AGFI accounts for the amount of DF in the given model. This modification adds a penalty for adding more parameters in order to adhere to the parsimony principle. Since they mainly evaluate the proposed model with no model at all, GFI and AGFI are classified as absolute fit indices (Byrne, 2016).

4.8.4.3.2 The Parsimony Normed Fit Index (PNFI)

PNFI modifies NFI by multiplying it with the Parsimony Ratio (PR). Elevated values of PNFI indicate comparatively better fit, making it usable in a manner similar to NFI. In addition to favouring simpler models, PNFI combines some aspects of incremental

fit indices over absolute fit indices. Once more, PNFI values are meant to be used for model comparison; the model with the highest PNFI value is the one that is considered most supported based on the factors that are represented in this index (Hair Jr *et al.*, 2014). The NFI measure has been modified to create PNFI. The amount of DF used to attain a specific level of fit is taken into account by the PNFI, in contrast to the NFI. According to Schumacker and Lomax (2010), parsimony in this context refers to obtaining a high degree of fit with fewer DF when defining the coefficients to be estimated.

4.8.4.3.3 Akaike Information Criterion (AIC)

AIC in a manner similar to that of the PNFI, models with different amounts of latent variables are compared using AIC. Instead of using the minimum fit function chi-square, AIC uses the weighted least squares chi-square from Normal theory (Schumacker & Lomax, 2010).

Based on the study of (Hair Jr *et al.*, 2014; Byrne, 2016; Schumacker & Lomax, 2010; Kline, 2016), the current study has considered Parsimony Measures such as AIC, PNFI, AGFI. Table 4.22 shows the common indicators of absolute measures of goodness of fit with the threshold and their sources compared with the result of the initial CFA model of social presence.

Table 4.22 GOF of Parsimony Measures of Social Presence

G.O.T Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	1276.279	Helpful for comparing models
	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.778	Helpful for comparing models
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.687	No

The table evaluates parsimony measures to assess the goodness-of-fit. To facilitate model comparison, AIC is presented, with lower values denoting better model fit. It also includes PNFI, which is helpful for comparing models because lower values indicate better model fit. The required criterion of .90 or .95 was not reached by AGFI, suggesting an unsatisfactory fit.

4.8.5 Model Modification

The primary objective of CFA is to determine the validity of a given measurement model. However, the CFA testing procedure provides additional diagnostic information that might suggest changes to address persistent problems or improve the model's capacity to test measurement theory (Hair Jr *et al.*, 2014). Because of CFA's strong theoretical underpinnings, researchers are cautioned against considering changes based only on empirical signs, such the diagnostics provided by CFA. As previously extensively detailed, a thorough review should instead take into account factors including the measurement model's overall theoretical soundness and the theoretical soundness of each particular construct, in addition to adhering to recognised assumptions and standard practices (Hair Jr *et al.*, 2014).

Within CFA, there exist diagnostic signs that are both easily implemented and useful. These include standardized residuals, modification indices, and scrutinizing specifications, which are particularly useful in identifying metrics problems (Hair Jr *et al.*, 2014). The study developed the model in the current study to meet the necessary threshold in accordance with earlier research because certain goodness of fit indicators did not meet the threshold score.

4.8.5.1 Standardized Residuals

Residuals represent the differences between observed covariance terms and the estimated covariance terms. A better match is indicated by smaller residuals. As a

result, every unique value in the observed covariance matrix has a corresponding residual term. By dividing the raw residuals by the residual's standard error, standardised residuals are produced. They are useful for locating problems inside a measurement model since they are not influenced by the range of the measurement scale (Hair Jr *et al.*, 2014).

Standardised residuals less than $|2.5|$ are usually regarded as unproblematic. When residuals are greater than $|4.0|$, it suggests that the error level may be intolerable and the problematic item should be removed. Standardised residuals in the range of $|2.5|$ to $|4.0|$ are worth examining, but if there are no additional problems associated with those specific items, there may be no need to make any changes to the model (Hair Jr *et al.*, 2014). According to the standardised residual covariances matrix results for the current investigation, no value is greater than 2.5, which means that no issues can be solved using this approach. Figure 4.7 shows standardized residual covariances (Second Order).

	RB6	Co4	Co3	Co2	Co1	Com1	Com2	Com3	Com4	Com5	RB1	RB2	RB3	RB4	RB5	Tr1	Tr2	Tr3	Tr4	Tr5	Tr6
RB6	.001																				
Co4	1.075	-.039																			
Co3	.826	.081	.028																		
Co2	1.539	.003	.049	.059																	
Co1	1.078	-.070	.038	.087	.055																
Com1	-.058	1.479	.736	.919	.792	-.052															
Com2	.074	.714	-.198	-.061	.014	.395	-.064														
Com3	.290	1.422	.144	.416	.164	-.218	.164	-.064													
Com4	.381	.137	.022	.436	-.129	-.303	-.026	-.198	-.063												
Com5	.694	.527	.783	.682	.847	-.244	-.479	-.181	.211	-.130											
RB1	.004	1.381	1.750	1.154	1.132	-.200	-.826	.527	-.192	-.800	.000										
RB2	-.138	-.631	1.034	.218	.267	-.194	-1.006	-.287	.387	-.257	.406	-.002									
RB3	-.080	1.528	1.462	1.593	1.890	.141	-.251	-.086	.180	.896	-.077	.087	-.029								
RB4	.126	1.778	.906	1.188	.834	.128	-.273	.124	-.633	-.337	-.268	.051	-.065	-.039							
RB5	.035	.616	.873	.878	1.058	-.303	.452	.913	-.016	.172	-.181	.113	-.482	.128	.000						
Tr1	-1.211	.058	-.128	-.108	-.372	.067	-.080	.256	-.854	-.137	.010	-1.344	.677	.570	-1.073	.078					
Tr2	-.163	.045	-.308	-.060	-.065	.069	-.326	-.242	-.135	.441	-.082	-.382	.468	-.489	-.864	.084	.071				
Tr3	-.729	-.398	-.055	-.157	-.268	-.238	-.137	-.142	-.474	.052	-.294	-.683	.326	-.179	-.905	.039	.118	.036			
Tr4	-.546	.186	-.200	-.177	-.034	-.330	-.695	-.148	-.276	.557	-.180	-.839	.648	-.846	-.821	.401	.133	.447	.028		
Tr5	.647	-.624	.116	-.100	.270	.184	.197	.036	-.225	1.204	.156	.290	.994	-.108	.911	.001	.139	-.043	-.070	.024	
Tr6	.938	-.456	.206	-.083	.086	.059	.028	-.162	-.737	.640	-.395	1.106	.711	.044	.647	.027	.182	.010	-.042	.064	.125

Figure 4.7 Standardized Residual Covariances (Second Order)

4.8.5.2 Modification Indices

Modification indices are also frequently included in typical SEM results. According to Hair Jr *et al.* (2014), these indices are calculated for every possible relationship that isn't already predicted within the model. When the modification index is approximately 4.0 or above, it means that enabling the related path to be estimated can improve the fit. Changes provide useful information about possible cross-loadings that could arise if specified, which helps researchers assess the degree of model misrepresentation without requiring a lot of additional model estimations. This is an essential tool for identifying indicator variables that may be troublesome and show cross-loadings (Hair Jr *et al.*, 2014).

In the current study, many adjustments were made according to the method of modification indices, starting with the highest values, and the model was gradually improved until all indicators of goodness of fit reached the required threshold. Figure 4.8 shows the development of the model according to the modification indicators method. It displays the results of the final CFA of the social presence components.

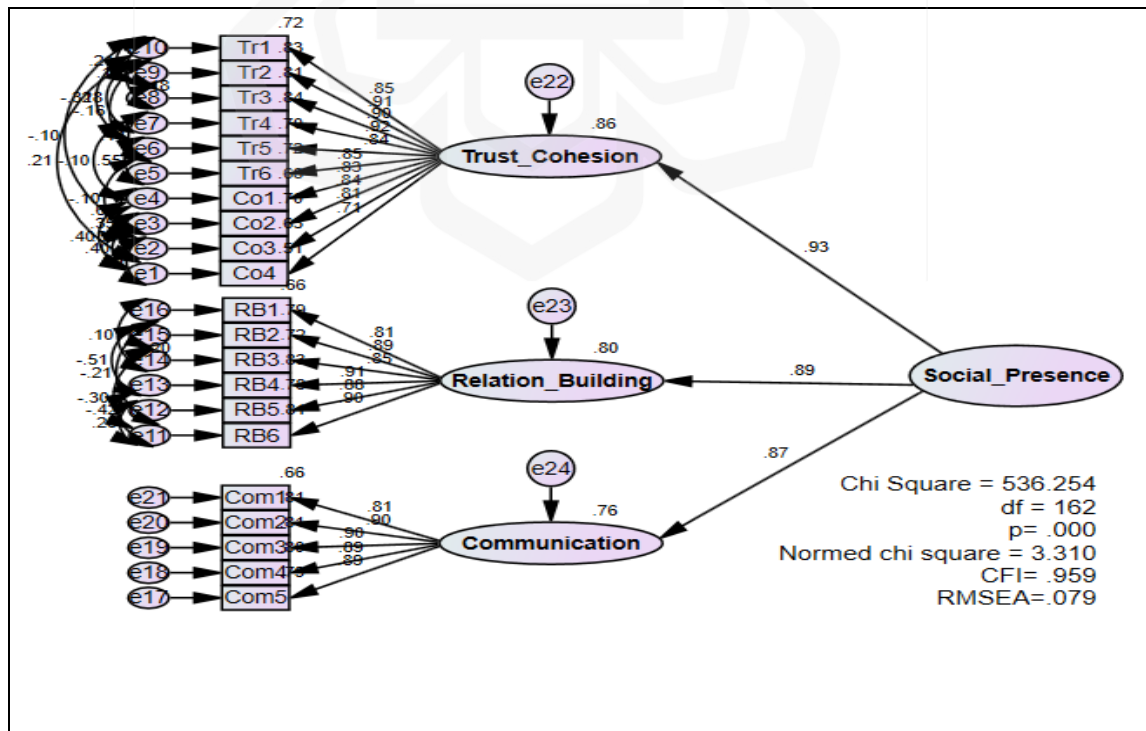


Figure 4.8 Final CFA of Social Presence Components

The results present the goodness of fit of Absolute Measures in the Final CFA Model of Social Presence according to various indices. The Comparative Fit Index (CMIN, χ^2) yielded a significant p-value ($p=0.000$), indicating a good fit. The ratio of χ^2 to DF (χ^2/df) is below the threshold of 5.0, with a value of 3.310, also indicating a good fit. Since the Root Mean Square Residual (RMR) is less than 0.10, the fit is considered satisfactory. A good fit is also indicated by the Standardized Root Mean Square Residual (SRMR), which is less than 0.08. With a criterion of 0.90, the Goodness of Fit Index (GFI) of 0.886 is deemed acceptable. RMSEA is 0.079, falling within the acceptable range of 0.05 to 0.08. Overall, the Absolute Measures in the Final CFA Model of Social Presence demonstrate a satisfactory goodness of fit. Table 4.23 demonstrates the GOF of absolute measures in the final CFA model of SP.

Table 4.23 GOF of Absolute Measures in the Final CFA Model of SP

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected ($N > 250$ & $m \geq 30$)	536.254 $P=0.000$	Yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>1 Over Identified	162	Yes
	χ^2/df	(Hair <i>et al.</i> , 2014)	< 5.0	3.310	Yes
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.014	Yes
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0346	Yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.886	Acceptable
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.079	Yes

Table 4.24 below shows using a variety of fit indices, the incremental measures' goodness of fit in the final CFA model of social presence. A satisfactory

match was indicated by TLI, which came in at 0.947, above the 0.90 cutoff. According to Hair *et al.* (2014) and Byrne (2016), CFI likewise surpassed the barrier with a score of 0.959, suggesting an excellent fit. Furthermore, the Normed match Index (NFI) met the requirement for a satisfactory match with a value of 0.943. Based on these indices, the Incremental Measures in the Final CFA Model of Social Presence show a generally satisfactory GOF. Table 4.24 displays GOF of incremental measures in the final CFA model of SP.

Table 4.24 GOF of Incremental Measures in the Final CFA Model of SP

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.947	Yes
	CFI	(Hair <i>et al.</i> , 2014) (Byrne, 2016)	>0.90 .90 or .95	0.959	Yes
	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.943	Yes

The results in Table 4.25 present the goodness of fit of Parsimony Measures in the Final CFA Model of Social Presence using various fit indices. With a value of 674.254, AIC demonstrated a superior model fit with lower values, rendering it valuable for comparing models. With a value of 0.727, the Parsimonious Normed Fit Index (PNFI) is a valuable tool for comparing models because lower values are indicative of better model fits. At 0.90 or 0.95, AGFI is deemed acceptable, with a value of 0.838. All things considered, AGFI implies an adequate fit by the given threshold, whereas AIC and PNFI suggest an excellent model fit based on their criteria. Table 4.25 illustrates GOF of parsimony measures in the final CFA model of SP.

Table 4.25 GOF of Parsimony Measures in the Final CFA Model of SP

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	674.254	Useful for comparing models

	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.727	Useful for comparing models
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.838	Acceptable

4.8.5.3 Specification Searches

A specification search involves an empirical process of trial and error that utilizes model diagnostics to recommend adjustments to the model. Essentially, whenever changes are made based on diagnostic indicators, it constitutes a form of specification search. These searches aim to identify the set of "new" relationships that most effectively enhance the overall model fit. This involves releasing fixed (non-estimated) relationships with the highest modification index (Hair Jr *et al.*, 2014).

The specification search method is discouraged for several reasons. First of all, it runs counter to the methodology and intended goal of techniques such as CFA, which is generally used as a confirmatory rather than an exploratory tool and is intended to examine pre-established theoretical frameworks. Second, it is difficult to determine if the variables indicated by the modification index alone are the cause of the problem in the model, as the estimation results of other parameters impact the results of one parameter. Thirdly, experiments conducted using simulated data have shown that looking for mechanical requirements is not a reliable way to find an accurate model, which might lead to misleading results (Hair Jr *et al.*, 2014). The current study did not adhere to the process of looking for specifications to enhance the model, based on the previously mentioned causes.

Overall, modifications to the form should be minor, not major. Changes to the model are deemed necessary if they incorporate the following, according to Hair Jr *et al.* (2014) and colleagues: First, a new data set will be needed to check any changes proposed by the model diagnostic that point to the existence of a new factor not included in the original measurement theory. Second, a fresh data set should be employed for additional verification if more than 20% of the measured variables are

eliminated or altered in connection to the factor they pertain to. This situation suggests that the adjustments made to the social presence variable's CFA model are negligible and have no bearing on the measurement theory.

4.9 CONFIRMATORY FACTOR ANALYSIS OF POOLED MODEL

Following the completion of the stage in which the CFA model for the social presence components—building relationships, communication, and trust and cohesion—was tested, the next step involved testing the CFA model pooled for the current study in accordance with the previously mentioned five stages, which were based on the research of Schumacker & Lomax (2010).

4.9.1 Model Specification

This study has adopted the conceptual framework based on recent studies such as the study of Tan *et al.* (2019) and based on the suggestion of other studies such as (Bhat *et al.*, 2017; Gordon, 2017; Han *et al.*, 2020; Watanuki & De Oliveira Moraes, 2016; Wei *et al.*, 2018; Mysirlaki & Paraskeva, 2020; Presbitero, 2019; Davidaviciene *et al.*, 2020) as it mentioned in the section of background of study model.

In the current study, based on prior studies, and related theories (SPT, MRT, SLT, and SET) and based on the results of exploratory factor analysis, the measurement model concludes with five variables, which are two independent variables of social presence (cohesion and trust, relationship building, and communication) and virtual leadership, a dependent variable (virtual team performance), a moderator variable (media richness), and a mediator variable (knowledge sharing). Measures of all variables were adopted based on previous studies (Choi *et al.*, 2008; Lin *et al.*, 2008; Wickramasinghe and Nandula, 2015; Wei *et al.*, 2018; Lin *et al.*, 2019; Dennis & Kinney, 1998; Jafari, 2021; Pangil & Chan, 2014). Table 4.26 represents model specification after EFA.

Table 4.26 Model Specification after EFA

Type of Variables	Name of variables		Items	Sources
Independent Variables	Social Presence Components	Trust and Cohesion	10 Items	Choi <i>et al.</i> (2008); Lin <i>et al.</i> (2008)
		Relationship Building	6 Items	Lin <i>et al.</i> (2008)
		Communication	5 Items	Wei <i>et al.</i> (2018)
Independent Variable	Virtual Leadership		6 Items	Lin <i>et al.</i> (2019)
Dependent Variable	Virtual Team Performance		8 Items	Wickramasinghe & Nandula, (2015) & (Jafari, 2021)
Mediating Variable	Knowledge Sharing		5 Items	Pangil & Chan, (2014)
Moderating Variable	Media Richness		7 Items	Dennis and Kinney (1998)
Total of Items			47	-

In particular, the scales for each factor were adopted from previous studies as follows. To evaluate trust, the study chose Choi *et al.* (2008) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes six items. To measure cohesion, the study chose Lin *et al.* (2008) measuring scale in the current study. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes four items.

To measure relationship building, this study adopted Lin *et al.* (2008)'s measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes six items. To measure communication, the study chose Wei *et al.* (2018) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes five items.

To test virtual leadership, the study chose Lin *et al.* (2019) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019). The scale includes six items. To measure knowledge sharing the study chose (Natu & Aparicio, 2022) measuring scale, the scale includes five items. To measure media richness, the study chose Dennis and Kinney (1998) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes seven items. To test virtual team performance, the study chose Wickramasinghe and Nandula (2015) measuring scale. This scale was used in organizational studies and was also employed in a virtual context by Tan *et al.* (2019) and Lin *et al.* (2008). The scale includes eight items.

Figure 4.9 shows the CFA of the initial pooled model of the current study, which was designed based on relevant theories and previous studies, which together formed the conceptual framework of the study.

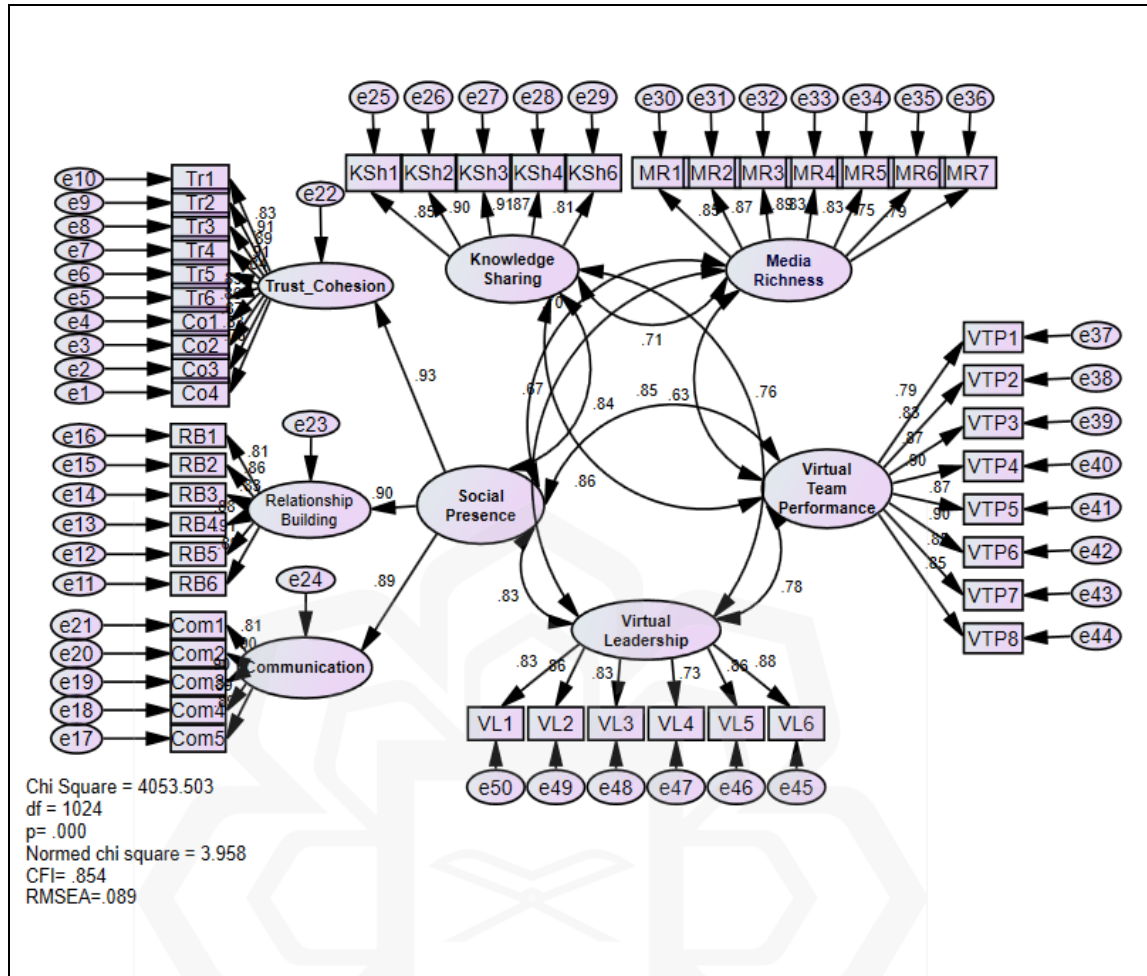


Figure 4.9 CFA of Initial Pooled Model

4.9.2 Model Identification

In the current study, the results of AMOS Software in the CFA Stage indicate that the number of distinct sample moments is 1128, and the number of distinct parameters to be estimated is 104, hence, $DF = 1128 - 104 = 1024$. Therefore, the model is over-identified, and the model of the current study could be estimated.

4.9.3 Model Estimation

In the model estimation phase, to initiate the modeling process, it is essential to have initial estimates (start values) for the parameters. The closer the initial guess is to the

actual start value, the fewer iterations are required to reach a solution. Various options exist for determining suitable start values (Tabachnick & Fidell, 2013). That parameters can be estimated by different estimation procedures, such as ML, GLS, and ULS. in the current study, we analyzed our confirmatory factor model using ML estimation with a standardized solution to report our statistical estimates of the free parameters (Schumacker & Lomax, 2010).

4.9.4 Model Testing

4.9.4.1 Absolute Fit Indices

The current study will consider Absolute Measures such as χ^2 (Significant p-values when $(N > 250 \text{ \& } m \geq 30)$); Normed Chi-Square (< 5); RMSEA (< 0.08); RMR (< 0.05); SRMR (.08 or less); GFI (> 0.90). The following table shows the common indicators of Absolute Measures of goodness of fit with threshold and their sources compared with the result of the pooled initial CFA model.

Table 4.27 presents various GOF statistics for evaluating the fit of a model to observed data. Key indices such as CMIN (χ^2), χ^2/df , RMR, SRMR, GFI, and RMSEA are assessed against predetermined thresholds to determine the model's adequacy. The results in the table display the GOF of Absolute Measures using various indices. The Comparative Fit Index (CMIN, χ^2) yielded a significant p-value ($P = .000$), indicating a good fit.

A good fit is also indicated by the χ^2 to DF (χ^2/df) ratio, which is 3.958 and below the 5.0 cut-off. A good fit is shown by the fact that both the Root Mean Square Residual (RMR) and the Standardised Root Mean Square Residual (SRMR) are below their respective criteria of 0.08 and 0.10. RMSEA and the Goodness of Fit Index (GFI) both indicated a less-than-ideal fit, however they did not reach their respective criteria. Table 4.27 displays GOF of absolute measures in the initial CFA model.

Table 4.27 GOF of Absolute Measures in the Initial CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected ($N > 250$ & $m \geq 30$)	4053.503 P= .000	yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>1 Over Identified	1024	yes
	χ^2/ df	(Hair <i>et al.</i> , 2014)	< 5.0	3.958	yes
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.018	yes
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0428	yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.660	No
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.089	No

4.9.4.2 Incremental Fit Indices

The Incremental Measures of goodness indicators are displayed in Table 4.28. The NFI index (>0.90); CFI >0.90); and TLI (>0.90) will be the criteria used in this study. GOF statistics for incremental measures—which assess how well a model advances over a baseline model—are included in the findings. NFI, TLI, and CFI are among the indices evaluated.

The model fit is assessed by comparing each index to predetermined thresholds. The obtained values for TLI (0.846), CFI (0.854), and NFI (0.815), all of which fall below the intended cut-offs, show that none of the incremental measures in this case match the suggested criteria for satisfactory fit. These findings imply that the model might not have improved the baseline model enough and could need to be further adjusted or refined in order to better fit the observed data. Table 4.28 represents GOF of incremental measures in the Initial CFA model.

Table 4.28 GOF of Incremental Measures in the Initial CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
--------------	-----------	-------	-----------	---------	--------------

Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.846	No
	CFI	(Hair <i>et al.</i> , 2014) (Byrne, 2016)	>0.90 .90 or .95	0.854	No
	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.815	No

4.9.4.3 Parsimony Fit Indices

The indicators of Parsimony Measures goodness of fit with threshold are displayed in Table 4.29 along with their sources, including AGFI (.90 or .95); PNFI (lower values for PNFI indicate a better model fit given according to Schumacker and Lomax, (2010); and AIC (lower values for AIC indicate a better model fit given according to Schumacker and Lomax (2010).

The results show how well Parsimony Measures match data using a variety of indices. With a value of 4261.503, AIC indicated a better model fit with lower values, facilitating model comparison. The Parsimonious Normed Fit Index (PNFI) yielded a score of 0.772, supporting model comparison as lower values suggest a better fit. On the other hand, AGFI dropped below the 0.90 or 0.95 level, suggesting that the fit was not as good as it could have been. Table 4.29 demonstrates the GOF of parsimony measures in the initial CFA model.

Table 4.29 GOF of Parsimony Measures in the Initial CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	4261.503	Helpful for comparing models
	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.772	Helpful for comparing models
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.626	No

4.9.5 Model Modification

CFA offers diagnostic indicators that are practical and easy to use, such as standardized residuals, modification indices, and specification searches, which can effectively identify metric-related issues (Hair Jr *et al.*, 2014). In this study, as certain GOF indicators didn't meet the required threshold, the study will improve the model to attain the desired level.

4.9.5.1 Standardized Residuals

Standardised residuals of less than $|2.5|$ are generally considered acceptable; those more than $|4.0|$ indicate a possibly unacceptable level of inaccuracy and should be taken into account when deciding whether to remove the problematic item. Standardised residuals in the range of $|2.5|$ to $|4.0|$ are worthy of examination, but if there are no additional problems linked to those particular items, there may be no need to make model changes (Hair Jr *et al.*, 2014). A review of the standardised residual covariances matrix in the current study shows that no values are larger than 2.5, which suggests that no problems were found using this approach (the matrix is too large to display).

4.9.5.2 Modification Indices

In this study, many adjustments were made based on modification indices, prioritizing those with the highest values, and iteratively refining the model until all indicators of goodness of fit met the specified threshold. Figure 4.10 illustrates the evolution of the model using the modification indices approach, presenting the outcomes of the final CFA for the combined model in this study.

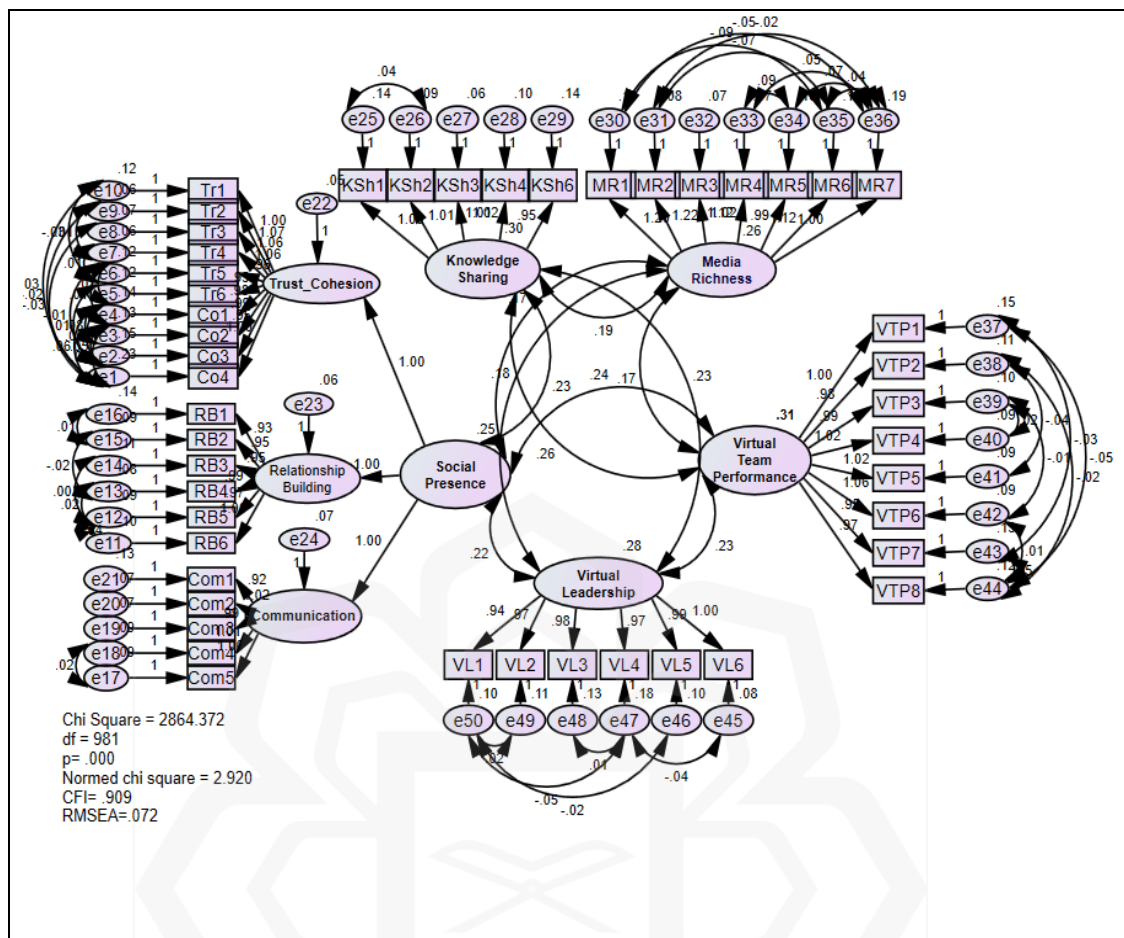


Figure 4.10 Final Pooled CFA Model

In the final pooled CFA model, the results indicated that the majority of the fit indices meet their respective thresholds. The Comparative Fit Index (CMIN/df) of 2.920 falls below the threshold of 5.0, indicating a good fit. Both the Root Mean Square Residual (RMR) and the Standardized Root Mean Square Residual (SRMR) are below their thresholds of 0.10 and 0.08, respectively, suggesting a good fit. Less than ideal fit is indicated by the Goodness of Fit Index (GFI) at 0.762, which does not meet the predetermined level. However, this index indicates a decent match because RMSEA at 0.072 is within the allowable range. Table 4.30 reveals GOF of absolute measures in the final pooled CFA model.

Table 4.30 GOF of Absolute Measures in the Final Pooled CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected (N > 250 & m $\geq$ 30)	2864.372 P= .000	yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>1 Over Identified	981	yes
	χ^2 / df	(Hair <i>et al.</i> , 2014)	< 5.0	2.920	yes
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.019	
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0451	yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.762	No
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.072	yes

Two of the three indicators in the final pooled CFA model showed satisfactory fit according to supplementary measures. CFI scored 0.909, likewise beyond the suggested threshold, and the TLI reached a value of 0.900, surpassing the 0.90 requirement. The NFI, however, is nearly at the necessary level but below the 0.869 threshold. Table 4.31 displays GOF of incremental measures in the final pooled CFA model.

Table 4.31 GOF of Incremental Measures in the Final Pooled CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.900	yes
	CFI	(Hair <i>et al.</i> , 2014) (Byrne, 2016)	>0.90 .90 or .95	0.909	yes

	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.869	No
--	------------	---	------------	-------	----

Three indicators are used to evaluate levels of parsimony in the final pooled CFA model. With a value of 3158.372, AIC shows a comparatively stronger model fit at lower values. With a score of 0.789, the Parsimony Normed match Index (PNFI) indicates a significantly weaker match; larger values indicate a better fit. Similar to this, AGFI of 0.726 is less than the necessary 0.90 or 0.95. Table 4.32 shows GOF of parsimony measures in the final pooled CFA model.

Table 4.32 GOF of Parsimony Measures in the Final Pooled CFA Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	3158.372	-
	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.789	-
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.726	No

4.9.5.3 Specification Searches

There are a few reasons why the specification search method is not recommended. First of all, it goes against the methodology and intended goal of techniques such as CFA, which is generally applied confirmatory rather than exploratory and is intended to validate predefined theoretical frameworks. Second, it is challenging to identify whether the problems in the model are limited to the variables indicated by the modification index because the estimation results of one parameter are influenced by those of other parameters. Thirdly, searches for mechanical requirements are unreliable in finding an accurate model and can produce misleading results, according to experimental tests conducted with simulated data (Hair Jr *et al.*, 2014). For these

reasons, the specification search method was not applied in the current study to improve the model.

4.9.6 Validity of CFA Model

The concept of validity is one of the basic issues that must be discussed before embarking on the analysis. Validity is the extent to which a scale or set of measures accurately represents the concept of interest (Hair Jr *et al.*, 2014). The accuracy of deductions made from results is the main emphasis of score validity, which gives researchers a sense of whether a test can achieve specific goals (Kline, 2016). The validity of a scale shows how well it measures the intended outcome. But there isn't one conclusive metric that establishes the validity of a scale. Rather, obtaining empirical data regarding a scale's use and effectiveness is the process of validating it (Pallant, 2010). Validity is the most important factor, demonstrating how well an instrument measures what it is supposed to measure (Kothari, 2004). In a nutshell, validity is the degree to which variations detected by a measuring tool accurately reflect real differences between the subjects or things being evaluated.

Similar to other statistical methods, SEM necessitates analyzing scores that possess strong evidence of validity. While score reliability is typically a prerequisite for score validity, it doesn't ensure it. Thus, ensuring good score reliability is also part of this requirement. Without it, the accuracy of interpreting the results becomes uncertain (Kline, 2016). The commonly acknowledged types of validity include content validity (face validity), nomological validity, and construct validity (convergent validity, discriminant validity) (Hair Jr *et al.*, 2014; Kline, 2016; Pallant, 2010).

A measurement model's correctness must be confirmed through validation. This procedure depends on a number of construct validity components, including face validity, nomological validity, discriminant validity, and convergent validity. According to Schumacker and Lomax (2010) the structural model appraises nomological validity, while the measurement model analyses both convergent and

discriminant validity. For validation, the current study will test the four fundamental categories.

4.9.6.1 Content Validity

Content validity focuses on whether test items accurately represent the domains they intend to assess. According to Kline (2016), the validity of the claim is established through experts judgements instead of statistical research. As defined by Pallant (2010, p7), content validity is "the adequacy with which a measure or scale has sampled from the intended universe or domain of content." By assessing how well the variables selected for a summated scale align with its conceptual description, content validity—also known as face validity—is assessed. Assessing the alignment between individual items and the concept can be done by pretests with a variety of subpopulations, expert judge reviews, or other techniques. According to Hair Jr *et al.* (2014), the goal is to make sure that while choosing scale items, theoretical and practical factors are taken into account in addition to empirical ones.

Furthermore, content validity assesses how well a tool covers the topic being studied. An instrument is considered to have strong content validity if it covers a representative sample of the complete scope. The main tools for evaluating its validity are judgements and intuition. Although there is no quantitative way to quantify it, it can also entail a panel of experts who assess how well the instrument satisfies the necessary standards (Kothari, 2004). When the items being measured conceptually match the description of a construct, face validity is attained (Hair Jr *et al.*, 2014).

In the current study, the study tool was adopted and adapted based on previous relevant studies. To evaluate the content validity, the validity of the questionnaire was reviewed by experts in the practical and academic fields to improve the formulation of the measurement items. The study tool was presented to specialists in the fields of human resources and leadership, and the reviewers were provided with operational definitions of the variables that make up the conceptual model of the current study

with the aim of comparing them with the items to measure them to ensure the validity of the scale's construction.

All comments received from the arbitrators were taken into account, which contributed significantly to enhancing the validity and compatibility of the study tool with the conceptual context of the target community. Finally, the study tool was presented to English language specialists to verify the linguistic formulation of the study tool. The names of the arbitrators, their specializations, and their places of work were previously presented in the section on pre-testing of the study tool.

4.9.6.2 Nomological Validity

Nomological validity is a validity test that scrutinizes whether the correlations among constructs in the measurement theory are logically coherent. Nomological validity is affirmed when a construct demonstrates consistent theoretical relationships with other constructs, nomological validity pertains to how well a summed scale predicts other concepts within a theoretically grounded model. Researchers need to pinpoint theoretically backed connections from previous studies or established principles and then evaluate whether the scale exhibits similar relationships. In essence, nomological validity assesses whether the scale reflects the relationships established by theory or previous research (Hair Jr *et al.*, 2014).

In the current study, based on the requirements of nomological validity, the model of the current study has relied on two basic pillars. The first pillar is the theories that were adopted in the current study, which are MRT, SPT, SLT, and SET theories. The second pillar on which the study model was built is previous relevant studies such as Tan *et al.* (2019); Bhat *et al.* (2017); Gordon (2017); Han *et al.* (2020); Oliveira Moraes (2016); Wei *et al.* (2018); Mysirlaki and Paraskeva (2020); Presbitero (2019); Davidaviciene *et al.* (2020).

4.9.6.3 Construct Validity

Construct validity examines whether scores effectively gauge an underlying hypothetical construct, which is latent and can only be indirectly measured through its indicators. Construct validity is not determined by a single study, nor is there a single, conclusive test for it. Instead, studies usually concentrate on particular dimensions of construct validity in the context of measurement-based inquiries (Kline, 2016). Instead of comparing a scale to a single criterion, construct validity assesses it using theoretical hypotheses about the characteristics of the underlying variable. During the validation process, the relationships between the scale and other constructs are investigated, covering both connected (convergent validity) and unconnected (discriminant validity) facets (Pallant, 2010). Moreover, the most complex and abstract type of validity is construct validity. It's a measure of how closely a measurement agrees with theoretically predicted correlations. Test scores' degree of explanation by the explanatory components in a strong theory is measured by this kind of validity (Kothari, 2004). In the current study, construct validity has been tested as CFA regularly examines assumptions related to these types of validity (Kline, 2016; Hair Jr *et al.*, 2014).

4.9.6.3.1 Convergent Validity

When variables intended to measure a similar construct show evidence of convergent validity, there is a considerable magnitude to their correlations. Shared method variance may cause measures measuring the same construct to have overstated correlations if they employ the same measurement technique. Thus, when assessments of the same presumed trait are obtained using different measuring techniques, the strongest evidence for convergent validity appears (Kline, 2016).

It is crucial to compute correlations between the adjusted total scores and item scores within a given dimension. Furthermore, correlations between total scores that evaluate several dimensions and item scores within a dimension should be calculated. According to Green and Salkind (2014), an item's correlation with adjusted total

scores inside its own scale or dimension should be the highest. Convergent validity assesses the degree of correlation between two measures of the same concept.

In this case, scientists may look for several conceptual measurements and then compare them to the combined scale. In this case, high correlations imply that the scale accurately reflects the intended idea, and estimates of extracted variance and construct reliabilities are helpful in verifying convergent validity (Hair Jr *et al.*, 2014). There are several ways to assess the level of convergent validity among item measurements, such as reliability, average variance extracted, and factor loadings.

1. Factor Loadings

One very important thing to take into account is the factor loading magnitude. When there is strong convergent validity, significant loadings on a factor suggest that the indicators converge on the latent construct, which is a common focus point. All factor loadings must, at the very least, be statistically significant. A basic rule is that standardised loading estimations should be at least .5, preferably .7 or above (Hair Jr *et al.*, 2014).

2. Average Variance Extracted

In CFA, the Average Variance Extracted (AVE) is computed as the mean variance extracted across the items loading on a particular construct, serving as a concise indicator of convergence. AVE represents the average squared completely standardized factor loading or average communality. Following this rationale, an AVE value of .5 or above is generally considered indicative of sufficient convergence. It's recommended to calculate an AVE measure for each latent construct within a measurement model (Hair Jr *et al.*, 2014).

3. Reliability

Additionally, reliability is a barometer of convergent validity. Although coefficient alpha is often used, reliability may be overestimated. SEM models frequently include a slightly varying construct reliability (CR) value, even if different reliability coefficients produce equivalent results. Good reliability is often indicated by a reliability estimate of .7 or higher, however reliability is in the range of .6 to .7 may still be acceptable if other construct validity indications for the model are satisfactory. When measures consistently reflect the same underlying construct, they are said to have high construct dependability (Hair Jr *et al.*, 2014).

The table in this study illustrates a CFA model's convergent validity across many constructs. Higher numbers indicate greater reliability. The Composite Reliability (CR) ratings show the reliability of each construct. The amount of variance collected by the construct's indicators is represented by AVE, with values above 0.5 often regarded as satisfactory. Mean Shared Variation (MSV) measures how much the indicators of the constructs share variation; it should be kept low to maintain discriminant validity. With a focus on discriminant validity, reliability, variance explained, and construct linkages. Table 4.33 evaluates the overall robustness of the CFA model in assessing the designated constructs.

Table 4.33 Convergent Validity of CFA Model

Constructs		Items	Loadings	CR	AVE	MSV
Social Presence	Trust and Cohesion	Tr1	0.843	0.928	0.811	0.724
		Tr2	0.927			
		Tr3	0.908			
		Tr4	0.917			
		Tr5	0.832			
		Tr6	0.830			
		Co1	0.820			
		Co2	0.835			
		Co3	0.802			
		Co4	0.753			
	Relation Building	RB1	0.813			
		RB2	0.873			
		RB3	0.845			

Constructs		Items	Loadings	CR	AVE	MSV
		RB4	0.892			
		RB5	0.878			
		RB6	0.869			
	Communication	Com1	0.815			
		Com2	0.905			
		Com3	0.907			
		Com4	0.882			
		Com5	0.879			
Virtual Leadership	VL1	0.843	0.934	0.703	0.689	
	VL2	0.841				
	VL3	0.819				
	VL4	0.777				
	VL5	0.861				
	VL6	0.885				
Media Richness	MR1	0.891	0.940	0.693	0.462	
	MR2	0.906				
	MR3	0.905				
	MR4	0.780				
	MR5	0.766				
	MR6	0.802				
	MR7	0.761				
Knowledge Sharing	KSh1	0.825	0.936	0.746	0.724	
	KSh2	0.882				
	KSh3	0.918				
	KSh4	0.875				
	KSh6	0.813				
Virtual Team Performance	VTP1	0.820	0.959	0.743	0.723	
	VTP2	0.857				
	VTP3	0.872				
	VTP4	0.888				
	VTP5	0.885				
	VTP6	0.896				
	VTP7	0.833				
	VTP8	0.842				

4.9.6.3.2 Discriminant Validity

Discriminant validity receives backing when the connections among various variables, meant to gauge distinct concepts, aren't overly strong. However, when the measures don't originate from the same techniques, this support gets stronger (Kline, 2016). Compute the relationships between total scores assessing several dimensions and item scores within a dimension. Convergent validity is the ability of an item to show a correlation with corrected total scores within its own scale. Furthermore, to demonstrate discriminant validity, an item must exhibit a higher association with these particular scores than with scale scores evaluating different constructs (Green & Salkind, 2014).

The degree of difference between two closely related concepts is known as discriminant validity. Correlation between the combined scale and a comparable but conceptually distinct measure is measured as part of the assessment. When the average amount of variance extracted for a construct is more than the amount of shared variance with other constructs, discriminant validity is confirmed (Hair Jr *et al.*, 2014). In this instance, a low correlation suggests that the combined scale successfully differs from the other related notion.

A more thorough analysis compares the square of the correlation estimate between any two constructs and AVE values for those constructs. The squared correlation estimate has to be less than the variance extracted estimations. This method is based on the idea that among its item measures, a latent construct should explain more of the shared variance with another construct. Fulfilling this assessment provides compelling proof of discriminant validity (Hair Jr *et al.*, 2014).

In the present study, Table 4.34 below represents the discriminant validity of a CFA model for five constructs: virtual team performance, media richness, virtual leadership, knowledge sharing, and social presence. The diagonal values (bold) are the square roots of AVE for each construct, ensuring that they are greater than the correlations between the constructs (off-diagonal values), and validating discriminant validity. The values off the diagonal indicate the correlations between pairs of constructs, which should ideally be lower than the square roots of their respective AVEs to support discriminant validity. In this case, the diagonal values are all higher

than the off-diagonal values, confirming the discriminant validity of the CFA model. Table 4.34 displays discriminant validity of CFA model.

Table 4.34 Discriminant Validity of CFA Model

	Virtual Team Performance	Media Richness	Virtual Leadership	Knowledge Sharing	Social Presence
Virtual Team Performance	0.862				
Media Richness	0.602	0.832			
Virtual Leadership	0.777	0.653	0.838		
Knowledge Sharing	0.850	0.680	0.771	0.863	
Social Presence	0.844	0.671	0.830	0.851	0.901

4.10 PATH ANALYSIS

Path analysis has been conducted through several stages; model specification, model identification, model estimation, model testing, and model modification as the following:

4.10.1 Model Specification

The conceptual framework used in this study was derived from recent research, including Tan *et al.*'s (2019) study. It is also based on the recommendations of other scholarly works such as Bhat *et al.* (2017); Gordon (2017); Han *et al.* (2020); Oliveira Moraes (2016); Wei *et al.* (2018); Mysirlaki and Paraskeva (2020); Presbitero (2019); and Davidaviciene *et al.* (2020).

This study's structural model identifies five variables, drawing from earlier research and pertinent theories such as (SLT, MRT, SPT, and SET Theories) as well as the results of an exploratory factor analysis. These include two independent variables social presence (cohesion and trust, relationship building, communication), and virtual leadership, a dependent variable (virtual team performance), a moderator variable (Media Richness), and a mediator variable (knowledge sharing).

The empirical findings of previous research studies, including (Tan *et al.*, 2019; Choi *et al.*, 2008; Lin *et al.*, 2008; Wickramasinghe and Nandula, 2015; Wei *et al.*, 2018; Lin *et al.*, 2019; Dennis & Kinney, 1998; Jafari, 2021; Pangil and Chan, 2014), were used to specify the structural model for all variables. The first pooled model used in the current investigation is shown in SEM diagram 4.11. This model was developed by drawing on relevant theories and previous research, which together shaped the conceptual framework of the study. Figure 4.11 demonstrates SEM Initial model.

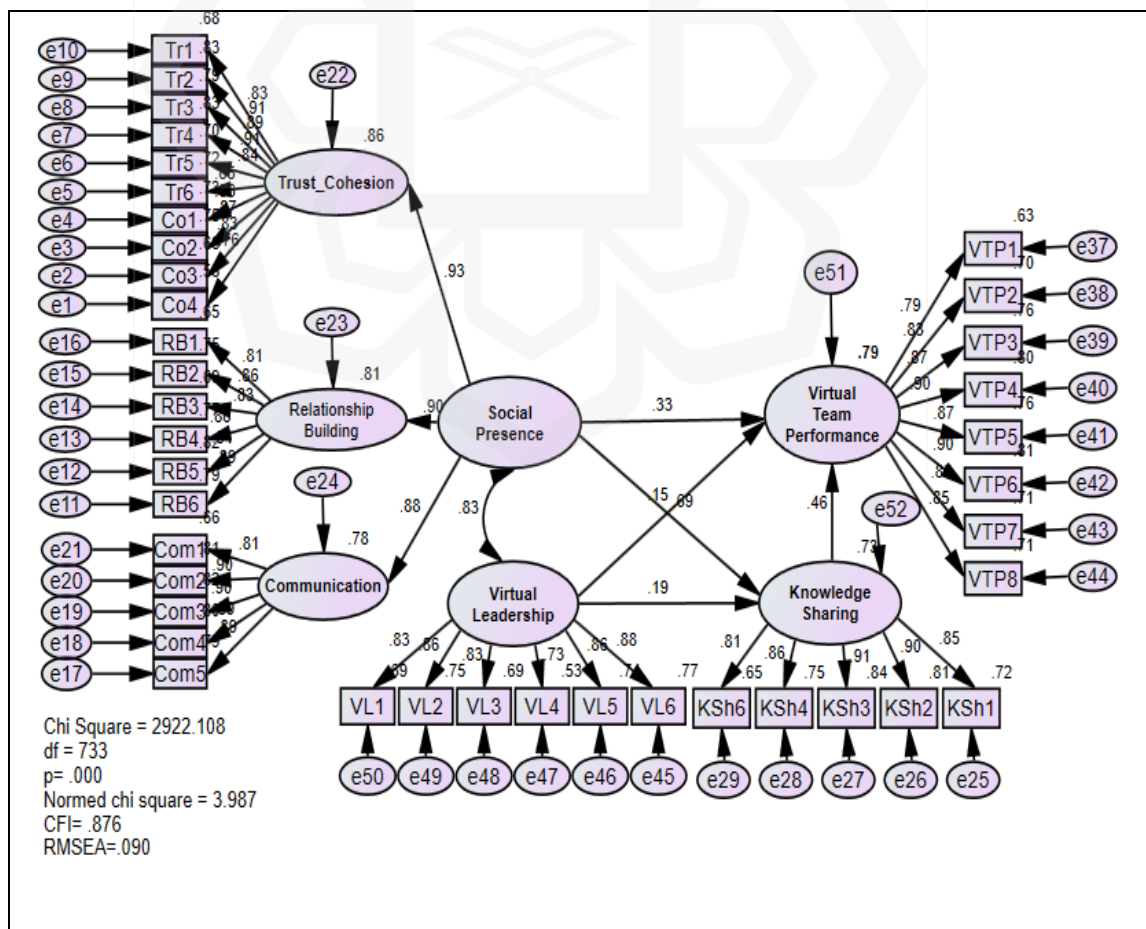


Figure 4.11 SEM Initial Model

4.10.2 Model Identification

According to the current study's Amos Software SEM Stage results, there are 820 distinct sample moments and 87 separate parameters that need to be estimated. As a result, $DF = 820 - 87 = 733$. As a result, the model is over identified, and the current study's model can be estimated.

4.10.3 Model Estimation

In order to begin the modelling process, it is essential to establish preliminary estimates, also known as start values, for the parameters during the model estimating phase. The fewer rounds required to arrive at a solution, the more closely these initial estimations match the real start values. Various techniques exist for ascertaining appropriate initial values (Tabachnick & Fidell, 2013). Several methods, including ML, ULS, and GLS, can be used to estimate parameters. This study adopted ML estimation to analyse our confirmatory factor model and presented our statistical estimates of the free parameters using a standardised solution (Schumacker & Lomax, 2010).

4.10.4 Model Testing

4.10.4.1 Absolute Fit Indices

Based on absolute measures, the first SEM model appears to be a decent fit overall. The large sample size ($N > 250$ & $m \geq 30$) was expected to produce a significant p-value ($p=0.000$) for chi-square GOF test (CMIN). Furthermore, the model's adequate identification (over-identification) is confirmed by $DF = (733)$. A satisfactory fit is shown by χ^2 to DF ratio (χ^2/df) being within the acceptable range (3.987).

A decent fit is further supported by the fact that the root mean square residual (RMR) and standardised root mean square residual (SRMR) are also below the suggested criteria (0.016 and 0.0398, respectively). GFI indicates a possible disagreement between the model and the data, however it is not close to the acceptable threshold (0.702). Likewise, RMSEA is higher than the suggested cut-off points of 0.090. Table 4.35 displays GOF of absolute measures in the initial SEM model.

Table 4.35 GOF of Absolute Measures in the Initial SEM Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected ($N > 250$ & $m \geq 30$)	2922.108	Yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>1 Over Identified	733	Yes
	χ^2/df	(Hair <i>et al.</i> , 2014)	< 5.0	3.987	Yes
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.016	Yes
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0398	Yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.702	No
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.090	No

4.10.4.2 Incremental Fit Indices

Based on incremental measures, the first SEM model fits data less well than optimally. At 0.868, TLI indicates an unsatisfactory fit, falling short of the suggested cut-off of 0.90. With values of 0.876 and 0.842, respectively CFI and NFI both fall short of the intended standards. These findings imply that more work needs to be done to improve the model's fit to the data. Table 4.36 demonstrates GOF of incremental measures in the initial SEM model.

Table 4.36 GOF of Incremental Measures in the Initial SEM Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.868	No
	CFI	(Hair <i>et al.</i> , 2014) (Byrne, 2016)	>0.90 .90 or .95	0.876	No
	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.842	No

4.10.4.3 Parsimony Fit Indices

The first SEM model is shown in the following table, with varying parsimony measure findings. With smaller values suggesting a better fit, AIC value of 3096.108 is useful for comparing models. With a value of 0.791, PNFI indicates a substandard fit and is below the required threshold. A less-than-ideal fit for the model is also suggested by AGFI, which is 0.666, below the suggested criterion of 0.90 or 0.95. These results suggest that even though the model might provide some parsimony, it could be improved to provide a better fit. Table 4.37 represents GOF of parsimony measures in the initial SEM model.

Table 4.37 GOF of Parsimony Measures in the Initial SEM Model

GOF	Fit	Cited	Threshold	Results	Fit
-----	-----	-------	-----------	---------	-----

Category	Index				(Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	3096.108	Helpful for comparing models
	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.791	Helpful for comparing models
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.666	No

4.10.5 Model Modification

Standardised residuals, modification indices, and specification searches are a few of the easy-to-use diagnostic tools that SEM offers and that are effective in identifying metric-related issues (Hair Jr *et al.*, 2014). Since some GOF metrics in this study did not satisfy the required standards, the study will adjust the model to reach the appropriate fit level.

4.10.5.1 Standardized Residuals

Typically, standardised residuals are generally regarded as acceptable if they are less than |2.5|; if they are more than |4.0|, there may be a possibility of an unacceptable degree of inaccuracy, indicating that the problematic item should be removed (Hair Jr *et al.*, 2014). Careful evaluation is necessary for standardised residuals lying between |2.5| and |4.0|; however, if no further problems are linked to those particular items, model revisions might not be necessary (Hair Jr *et al.*, 2014). According to this criterion, the examination of the standardised residual covariances matrix in this study shows no problems, suggesting that no problems were found using this method (the Standardised Residual Covariances matrix is too big to display).

4.10.5.2 Modification Indices

Several changes were applied in this study using modification indices, with the highest values being applied first, and the model being improved iteratively until all measures of fit were above the predefined threshold. The model's evolution utilising the modification indices approach is shown in the diagram below, which also presents the findings of the final structural equation model for the combined model in this study. Figure 4.12 displays SEM final model.

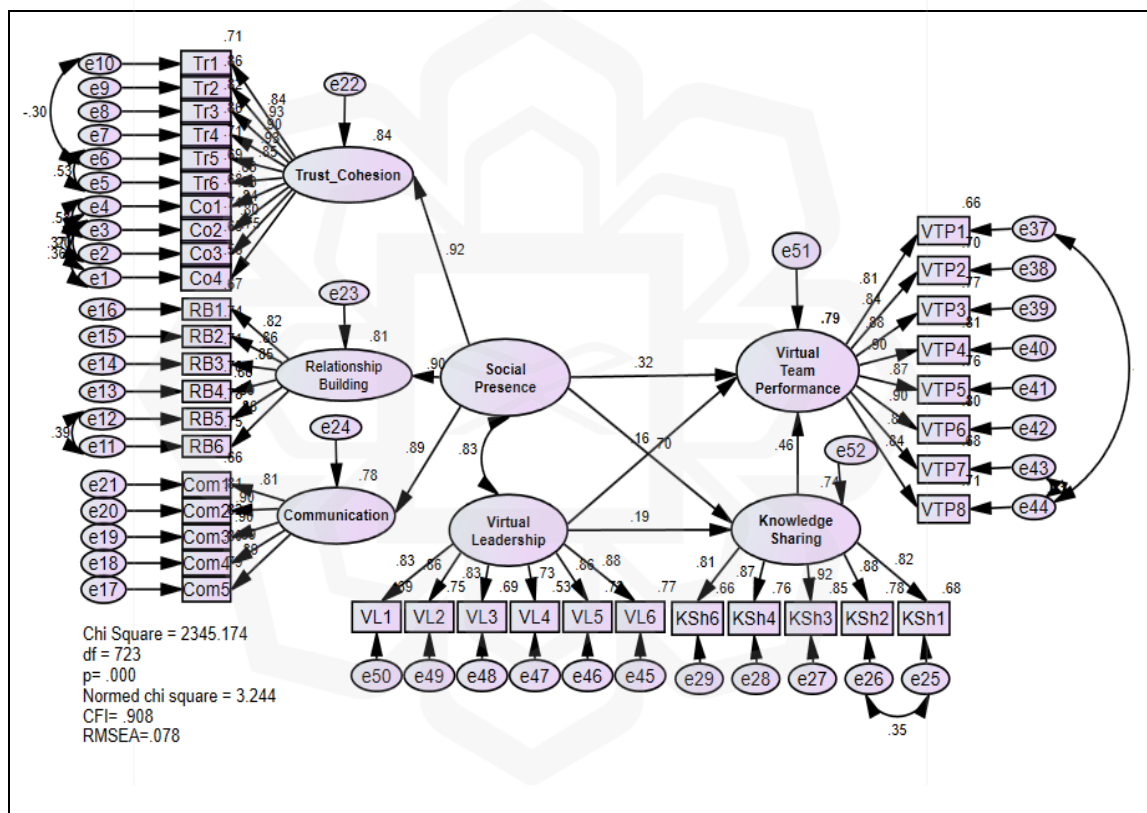


Figure 4.12 SEM Final Model

Modifications were performed to the final SEM model until all GOF metrics were within the designated criteria. X2 to DF ratio (χ^2/df) of 3.244, which is less than the suggested threshold of 5.0, indicates that the model is significant, with a significant χ^2 value (CMIN) of 2345.174 ($p=.000$). Furthermore, the RMSEA (root mean square error of approximation) was found to be 0.078, which is within the acceptable range of 0.05 to 0.08. The RMR and SRMR (standardised root mean

square residual) were also found to be good at 0.017 and 0.0406, respectively. But the goodness of fit index (GFI), which was 0.760, just missed the cut-off point. Table 4.38 shows GOF of absolute measures in the final SEM model.

Table 4.38 GOF of Absolute Measures in the Final SEM Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Absolute Measures	CMIN (χ^2)	(Hair <i>et al.</i> , 2014)	Significant p-values expected (N > 250 & m $\geq$ 30)	2345.174 P= .000	Yes
	df	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>1 Over Identified	723	Yes
	χ^2/ df	(Hair <i>et al.</i> , 2014)	< 5.0	3.244	Yes
	RMR	(Schumacker & Lomax, 2010)	< 0.10	0.017	Yes
	SRMR	(Hair <i>et al.</i> , 2014)	.08 or less	0.0624	Yes
	GFI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.760	No
	RMSEA	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	< 0.08 .05 to .08	0.078	Yes

The incremental measures in the final SEM model showed a fair match. CFI showed a similarly strong match at 0.908, exceeding the intended threshold, while TLI was 0.901, exceeding the 0.90 criterion. At 0.873, the Normed match Index (NFI) likewise met the requirements for a satisfactory match. Table 4.39 displays GOF of incremental measures in the final SEM model.

Table 4.39 GOF of Incremental Measures in the Final SEM Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Incremental Measures	TLI	(Hair <i>et al.</i> , 2014) (Schumacker & Lomax, 2010)	>0.90 .90 or .95	0.901	Yes
	CFI	(Hair <i>et al.</i> , 2014)	>0.90	0.908	Yes

		(Byrne, 2016)	.90 or .95		
	NFI	(Schumacker & Lomax, 2010) (Byrne, 2016)	.90 or .95	0.873	Acceptable

The final SEM model's goodness of fit was assessed using parsimony metrics, and AIC produced a value of 2539.174. A better model fit is suggested by lower AIC values, which also show that the final model is comparatively more effective at describing the data. The model's fit was further reinforced by the Parsimonious Normed Fit Index (PNFI), which came out at 0.809. A better match is indicated by PNFI values that are lower. Nevertheless, at 0.728, AGFI was below the intended level, indicating that the model's parsimonious fit may have limitations. In spite of this, the AIC and PNFI combined findings show a generally good balance between model complexity and fit. Table 4.40 demonstrates GOF of parsimony measures in the final SEM model.

Table 4.40 GOF of Parsimony Measures in the Final SEM Model

GOF Category	Fit Index	Cited	Threshold	Results	Fit (Yes/No)
Parsimony Fit Measures	AIC	(Schumacker & Lomax, 2010)	Lower values for AIC indicate a better model fit given	2539.174	-
	PNFI	(Schumacker & Lomax, 2010)	Lower values for PNFI indicate a better model fit given	0.809	-
	AGFI	(Schumacker & Lomax, 2010)	.90 or .95	0.728	No

4.11 TESTING RESEARCH HYPOTHESIS

The SEM analysis is utilized to tackle research inquiries. Based on the conducted statistical analysis. The regression route coefficient weights in the table below show the links between the various components in the virtual team dynamics setting. Knowledge sharing, social presence, virtual team performance, and critical ratios (C.R.) are the factors that are taken into account, along with their corresponding estimations, standard errors (S.E.), and p-values (P). To summarise, the weights

assigned to the regression path coefficients shed light on the connections between knowledge sharing, social presence, virtual leadership, and virtual team performance in virtual teams. This emphasises the significance of cultivating effective communication, teamwork, and leadership to promote optimal team functioning and performance in virtual environments. The results of the present study are displayed in Table 4.41.

Table 4.41 Regression Path Coefficient Weights

No	Factor		Factor	Estimate	S.E.	C.R.	P
H1	Knowledge Sharing	<---	Social Presence	0.765	0.082	9.277	***
H2	Knowledge Sharing	<---	Virtual Leadership	0.194	0.072	2.704	0.007
H3	Virtual_Team_Performance	<---	Knowledge Sharing	0.464	0.069	6.690	***
H4	Virtual_Team_Performance	<---	Social Presence	0.353	0.088	3.988	***
H5	Virtual_Team_Performance	<---	Virtual Leadership	0.168	0.061	2.738	0.006

Standardised regression weights illustrating the connections between several elements relevant to virtual team dynamics are shown in the table below. Knowledge sharing, social presence, virtual leadership, and virtual team performance are among the aspects examined, along with estimations for each. As a whole, the Table's standardised regression weights highlight the connections between knowledge sharing, social presence, virtual leadership, and virtual team performance in virtual teams. This highlights how crucial it is to promote efficient communication, teamwork, and leadership in order to enable the best possible team functioning and performance in virtual environments. Table 4.42 represents standardized regression weights.

Table 4.42 Standardized Regression Weights

No	Factor	Relationship	Factor	Estimate
H1	Knowledge Sharing	<---	Social Presence	0.698
H2	Knowledge Sharing	<---	Virtual Leadership	0.187
H3	Virtual_Team_Performance	<---	Knowledge Sharing	0.461

No	Factor	Relationship	Factor	Estimate
H4	Virtual_Team_Performance	<---	Social Presence	0.320
H5	Virtual_Team_Performance	<---	Virtual Leadership	0.160

Here each hypothesis of the study has been discussed in detail as follows:

4.11.1 Testing Hypothesis 1

Hypothesis 1 has been stated as the following: “*There is a significant positive relationship between social presence and knowledge sharing among administrators at HEIs Malaysia*”. The results from testing Hypothesis 1, which posits a significant positive relationship between social presence and knowledge sharing, are highly significant and support the hypothesis.

With a CR of 9.277 and a p-value of .000, the estimated coefficient for the link between social presence and knowledge sharing is 0.698. When CR is significantly higher than the generally accepted significance threshold of 1.96, a strong association is present. The fact that the p-value is below 0.05, which is generally considered to be statistically significant, serves to further emphasise the importance of the association. Thus, it can be inferred from these results that, in the context of the study, social presence and information sharing do have a strong positive relationship. This implies that the tendency to share knowledge grows with social presence, highlighting the role of social interactions in promoting knowledge exchange in the examined context. Table 4.43 shows the results of testing hypothesis -1.

Table 4.43 Testing Hypothesis -1

Hypothesis-1	Estimate	C.R	P-Value	Assessment
SP → K.Sh	0.698	9.277	.000	Supported

4.11.2 Testing Hypothesis 2

Hypothesis 2 has been stated as the following: “*There is a significant positive relationship between virtual leadership and knowledge sharing among administrators at HEIs Malaysia*”. The analysis of Hypothesis 2, which investigates the relationship between virtual leadership and knowledge sharing, reveals compelling evidence supporting the hypothesis.

Knowledge sharing and virtual leadership have an estimated correlation coefficient of 0.187. Additionally, the data show statistical significance with a p-value of 0.007 and a CR of 2.704. There is a strong correlation between virtual leadership and knowledge sharing, as evidenced CR being greater than 1.96 and the p-value being less than the expected level of 0.05. Thus, in light of these results, it can be said that, at least in the context of the study, virtual leadership and knowledge sharing do have a sizable positive relationship. This suggests that proficient virtual leadership has a good impact on participants' inclination to share knowledge. These findings highlight the value of effective virtual leadership in creating a knowledge-sharing atmosphere, which is essential for organisational success, especially in remote or virtual work environments. Table 4.44 shows the results of testing hypothesis -2.

Table 4.44 Testing Hypothesis -2

Hypothesis-2	Estimate	C.R	P-Value	Assessment
VL→ K.Sh	0.187	2.704	0.007	Supported

4.11.3 Testing Hypothesis 3

Hypothesis 3 has been stated as the following “*There is a significant positive relationship between knowledge sharing and virtual teams' performance among administrators at HEIs Malaysia*.”. The analysis of Hypothesis 3, which examines the relationship between knowledge sharing and virtual teams' performance, yields compelling evidence in support of the hypothesis.

The performance of virtual teams and knowledge sharing are predicted to be correlated with an estimated coefficient of 0.461. The results also show great statistical significance, with a p-value of .000 and CR of 6.690. With the p-value being significantly less than 0.05 and the crucial ratio exceeding the 1.96 criterion, there is a strong positive correlation between knowledge sharing and the effectiveness of virtual teams. Thus, it can be inferred from these results that, in the context of the research, knowledge sharing and virtual teams' performance do, in fact, have a strong positive relationship. This implies that improved knowledge exchange among virtual team members benefits the group's performance as a whole. These findings highlight the vital role that efficient knowledge-sharing techniques play in optimising the performance of virtual teams and highlight the significance of creating collaborative settings that encourage the exchange of ideas and knowledge. Table 4.45 shows the results of testing hypothesis -3.

Table 4.45 Testing Hypothesis -3

Hypothesis-3	Estimate	C.R	P-Value	Assessment
K.Sh →VTP	0.461	6.690	.000	Supported

4.11.4 Testing Hypothesis 4

Hypothesis 4 has been stated as the following “*There is a significant positive relationship between social presence and virtual teams’ performance among administrators at HEIs Malaysia*”. The analysis of Hypothesis 4, which investigates the relationship between social presence and virtual teams' performance, presents compelling evidence supporting the hypothesis.

The success of virtual teams and social presence are predicted to be correlated with a correlation of 0.320. The results also show great statistical significance, with a p-value of .000 and a CR of 3.988. There is a strong positive correlation between social presence and the success of virtual teams, as evidenced by CR reaching the 1.96 threshold and the p-value being significantly less than 0.05. Therefore, it can be

concluded from these results that, in the context of the study, social presence and virtual teams' performance have a substantial positive association.

This suggests that individuals of virtual teams perform better as a whole when they are more socially present. These findings highlight the role that social interactions play in promoting team effectiveness in virtual environments and underscore the significance of encouraging a sense of closeness and engagement among members of virtual teams in order to improve their performance. Table 4.46 shows the results of testing hypothesis -4.

Table 4.46 Testing Hypothesis -4

Hypothesis-4	Estimate	C.R	P-Value	Assessment
SP → VTP	0.320	3.988	.000	Supported

4.11.5 Testing Hypothesis 5

Hypothesis 5 has been stated as the following: *“There is a significant positive relationship between virtual leadership and virtual teams’ performance among administrators at HEIs Malaysia”*. The analysis of Hypothesis 5, which explores the relationship between virtual leadership and virtual teams' performance, reveals significant support for the hypothesis.

The estimated coefficient for the relationship between virtual leadership and virtual teams' performance is 0.160. Furthermore, with a CR of 2.738 and a p-value of 0.006, the results demonstrate statistical significance. CR exceeding the threshold of 1.96 and the p-value being less than 0.05 indicate a robust positive relationship between virtual leadership and virtual teams' performance. Thus, based on these findings, it can be concluded that there exists a significant positive relationship between virtual leadership and virtual teams' performance within the context of the research.

This implies that the performance of virtual teams is positively impacted by competent virtual leadership. These findings show the value of effective leadership in virtual environments and the part virtual leaders play in inspiring and directing their teams to reach high performance standards in spite of organisational and geographic barriers. Table 4.47 shows the results of testing hypothesis -5.

Table 4.47 Testing Hypothesis -5

Hypothesis-5	Estimate	C.R	P-Value	Assessment
VL → VTP	0.160	2.738	0.006	Supported

4.12 MEDIATING TEST OF THE KNOWLEDGE SHARING

4.12.1 Testing Hypothesis 6

Since the results of the study proved that social presence affects knowledge sharing H1, and knowledge sharing affects virtual team performance H3, it is expected that knowledge sharing will be a mediator in the relationship between social presence and virtual team performance, and therefore this relationship will be tested with Hypothesis 6. H6 is stated as the following “*The relationship between social presence and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia*”. The analysis of Hypothesis 6, which explores the mediating role of knowledge sharing in the relationship between social presence and virtual teams' performance, reveals compelling evidence supporting the hypothesis.

It is calculated that knowledge sharing mediates the direct impact of social presence on the performance of virtual teams by 0.353. Furthermore, it is calculated that social presence has an indirect impact of 0.355 on the knowledge sharing performance of virtual teams. The estimate is 0.707 when taking into account the total effects, which comprise both direct and indirect effects. All of the p-values for these effects go below the 0.05 cutoff, with the indirect effect being especially noteworthy

at 0.001. As a result, the hypothesis is supported by the statistical significance of all effects.

These findings suggest that the relationship between social presence and virtual teams' performance is indeed mediated by knowledge sharing. In other words, social presence influences virtual teams' performance both directly and indirectly through its impact on knowledge sharing. Therefore, the mediating influence of knowledge sharing on the relationship between social presence and virtual team performance is partial. This highlights the crucial role of knowledge sharing as a mechanism through which social presence enhances the performance of virtual teams. Such insights can inform strategies aimed at fostering collaboration and knowledge exchange within virtual team environments, ultimately contributing to improved team effectiveness and outcomes. Table 4.48 shows the results of testing hypothesis -6.

Table 4.48 Testing Hypothesis -6

Hypothesis-6	Direct Effects	Indirect Effects	Total Effects
SP→ K.Sh →VTP	0.353	0.355	0.707
P-Value	0.015	0.001	0.005
Decision	Supported	Supported	Supported

4.12.2 Testing Hypothesis 7

Since the results of the study proved that virtual leadership affects knowledge sharing H2, and knowledge sharing affects virtual team performance H3, it is expected that knowledge sharing will be a mediator in the relationship between virtual leadership and virtual team performance, and therefore this relationship will be tested with Hypothesis 7.

H7 states that "*knowledge sharing mediates the relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia*" The investigation of Hypothesis 7 looks into how knowledge sharing influences the

relationship between virtual teams' performance and virtual leadership. Knowledge sharing acts as a mediator between virtual leadership and virtual team performance, and the estimated value of this effect is 0.168. On the other hand, it is estimated that there is an indirect impact of virtual leadership of 0.090 on the performance of virtual teams through knowledge exchange. The estimate is 0.258 when taking into account the total effects, which include both direct and indirect effects. With a p-value of 0.071, the indirect effect is not statistically significant at the customary threshold of 0.05, however, the direct effect is statistically significant with a p-value of 0.032.

Even yet, the p-value of 0.014 indicates that the overall effect is still statistically significant. Thus, the hypothesis is partially validated, suggesting that although knowledge sharing has an indirect effect that is not statistically significant, virtual leadership has a direct impact on the performance of virtual teams. According to these results, knowledge sharing does not considerably mediate the direct impact of virtual leadership on the performance of virtual teams. This underscores the necessity of conducting additional research to investigate the mechanisms by which virtual leadership impacts team performance in virtual environments. Table 4.49 shows the results of testing hypothesis -7.

Table 4.49 Testing Hypothesis -7

Hypothesis-7	Direct Effects	Indirect Effects	Total Effects
VL→ K.Sh →VTP	0.168	0.090	0.258
P-Value	0.032	0.071	0.014
Decision	Supported	Not Supported	Supported

4.13 MODERATING TESTING OF MEDIA RICHNESS

4.13.1 Testing Hypothesis 8

In the moderation analysis, the means of the continuous variables social presence, media richness, virtual team performance, and their values were standardised using

SPSS. Next, by multiplying the values of social presence and media richness, an interaction variable (Interaction) was produced. The path model was then created in AMOS to investigate the impact of the interaction variable, as shown in Figure 4.13.

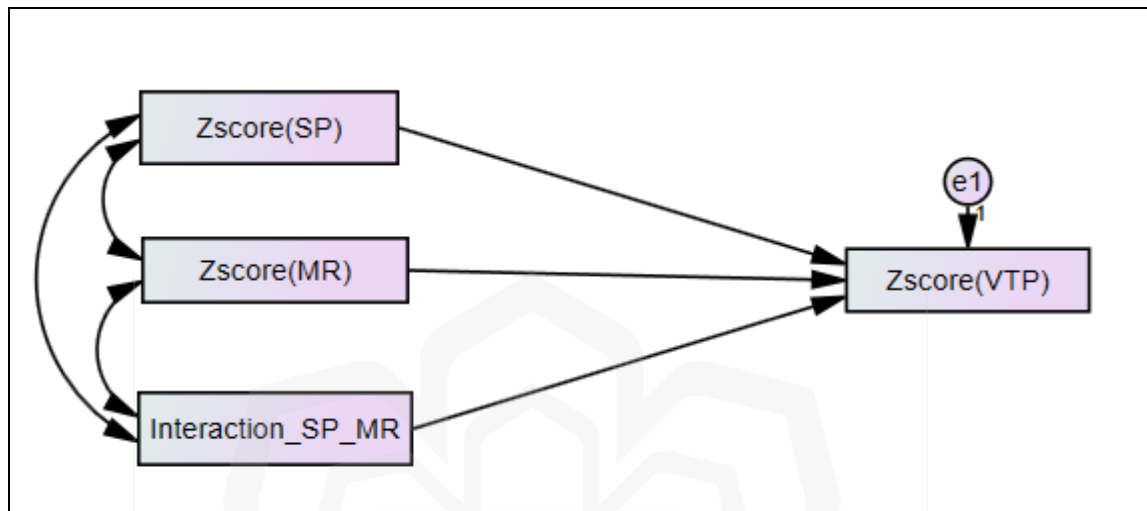


Figure 4.13 Moderation Model of MR on the relationship between SP and VTP

H8 is defined as follows: *"The relationship between social presence practices and virtual team performance is moderated by media richness among administrators at HEIs Malaysia"*. The results of examining how media richness modifies the association between social presence practices and virtual team performance are shown in the table. The direction and intensity of the associations are shown by the standardised regression weights.

With a CR of 16.695, the estimate of the association between social presence practices and virtual team performance is 0.690, indicating a highly significant positive relationship. Likewise, a significant positive association is indicated by the estimate of 0.159 and a C.R. of 3.866 for the relationship between media richness and virtual team performance. The relationship between media richness and social presence behaviours, however, exhibits an interaction term with a non-significant coefficient of -0.021, a C.R. of -0.873, and a p-value of 0.383.

This shows that the association between social presence practices and virtual team performance is not considerably moderated by media richness. Therefore, while both social presence practices and media richness individually affect virtual team performance positively, media richness does not significantly alter the impact of social presence practices on virtual team performance. Table 4.50 shows the results of testing hypothesis -8.

Table 4.50 Testing Hypothesis-8

Factor		Factor	Estimate	S.E.	C.R.	Standardized Regression Weights	P
ZVTP	<---	ZSP	.690	.041	16.695	.690	***
ZVTP	<---	ZMR	.159	.041	3.866	.159	***
ZVTP	<---	Interaction_SP_MR	-.021	.024	-.873	-.027	.383

The impact of social presence on the performance of virtual teams at low and high media richness levels is depicted in Figure 4.14. The findings indicate that social presence influences virtual teams' performance more when there is a high degree of media richness than when there is a low degree of media richness, although the difference in influence is still not statistically significant. Figure 4.14 demonstrates the moderation of media richness on the relationship between social presence and virtual teams' performance.

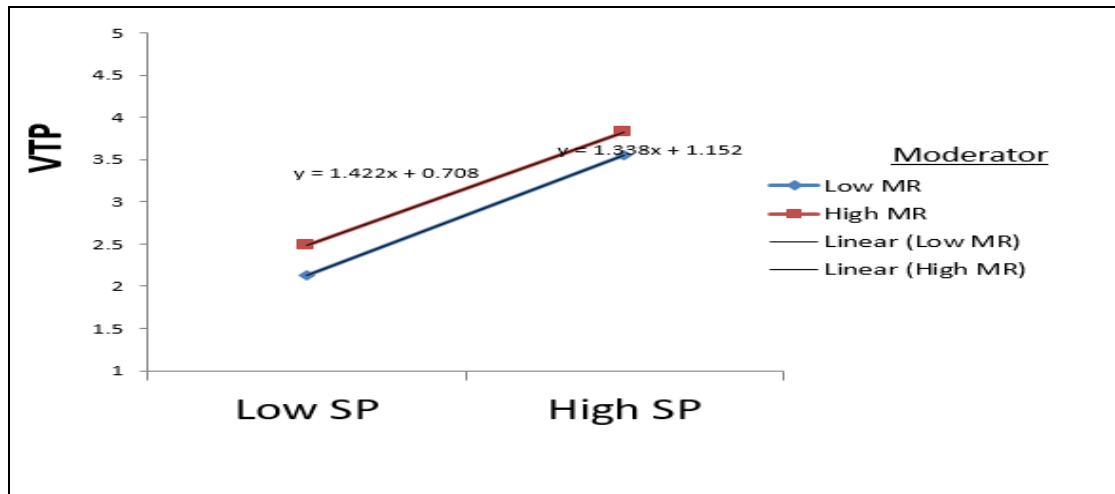


Figure 4.14 Moderation of MR on the Relationship between SP and VTP

4.13.2 Testing Hypothesis 9

SPSS software was used in the moderation analysis to standardise the values and determine the means of the continuous variables virtual leadership, media richness, virtual team performance. Next, by multiplying the values of virtual leadership and media richness, an interaction variable (Interaction) was created. The path model was then created in AMOS software to investigate the impact of the interaction variable, as shown in figure 4.15.

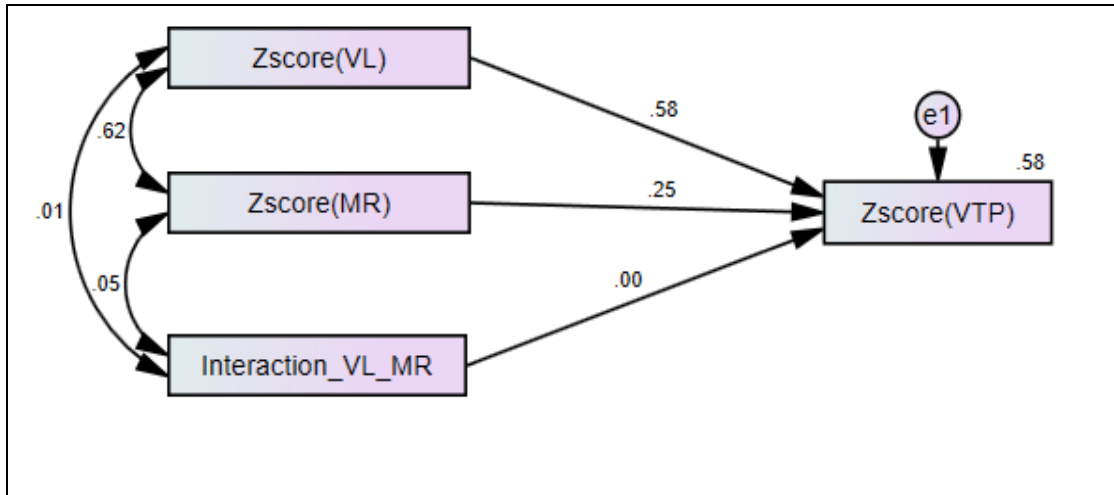


Figure 4.15 Moderation Model of MR on the Relationship between VL and VTP

According to H9, the following "The relationship between virtual leadership and virtual team performance is moderated by media richness among administrators at HEIs Malaysia". The results of examining how media richness modifies the relationship between virtual leadership and virtual team performance are shown in the table. The direction and intensity of the associations are shown by the standardised regression weights.

At a CR of 5.858, which indicates a statistically significant positive association, the relationship between media richness and virtual team performance is estimated to be 0.252. Analogously, the correlation coefficient between virtual leadership and virtual team performance is estimated to be 0.592, accompanied by a confidence interval of 13.462, which suggests a highly significant positive link. A non-significant coefficient of -0.001, a C.R. of -0.049, and a p-value of 0.961, however, are displayed by the interaction term between virtual leadership and media richness.

This suggests that the association between virtual leadership and virtual team performance is not considerably moderated by media richness. Consequently, media richness does not seem to significantly affect the impact of virtual leadership on virtual team performance in our analysis, even if both virtual leadership and media

richness independently have a beneficial impact on virtual team performance. Table 4.51 demonstrates testing hypothesis-9.

Table 4.51 Testing Hypothesis-9

Factor		Factor	Estimate	S.E.	C.R.	Standardized Regression Weights	P
ZVTP	<---	ZMR	.252	.043	5.858	.252	***
ZVTP	<---	ZVL	.592	.044	13.462	.578	***
ZVTP	<---	Interaction_VL_MR	-.001	.026	-.049	-.002	.961

The impact of virtual leadership on the performance of virtual teams at different media richness levels is depicted in the accompanying Figure 4.16. The findings indicate that, although the difference in influence is still statistically insignificant, virtual leadership has a greater impact on virtual teams' performance when media richness is higher than when it is lower. Figure 4.16 shows the moderation of media richness on the relationship between virtual leadership and virtual teams' performance.

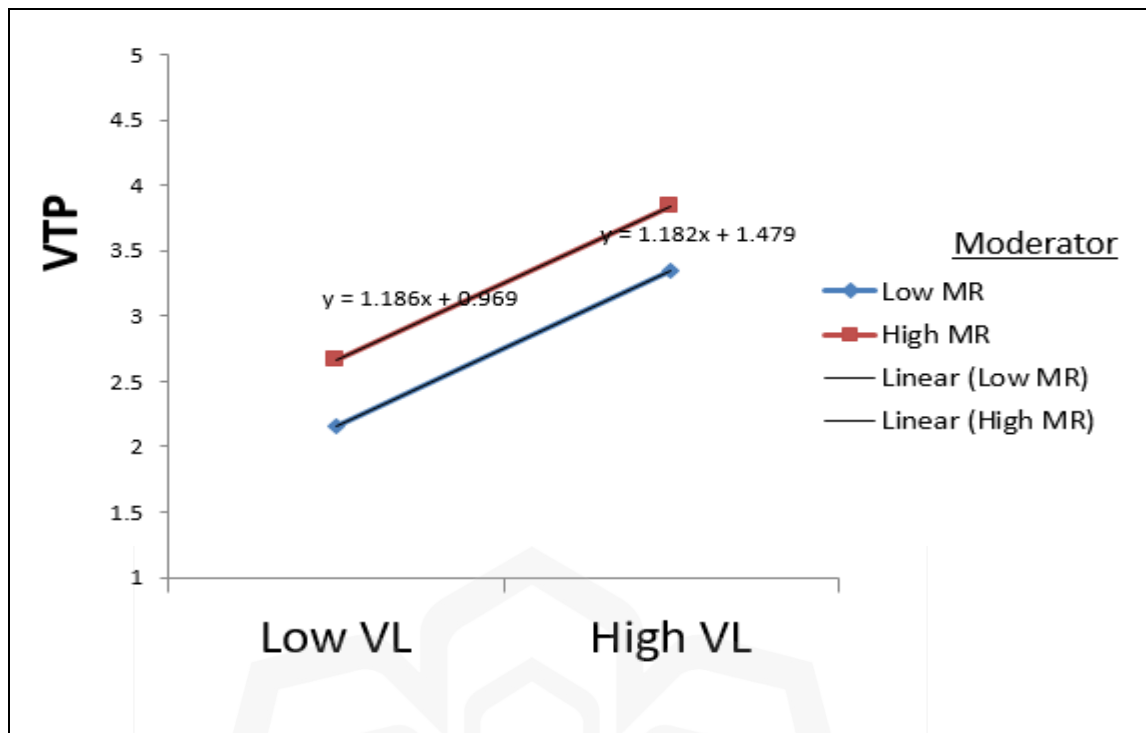


Figure 4.16 Moderation of MR on the Relationship between VL and VTP

The findings of hypothesis testing about the connections between important variables in a research model are shown in Table 4.52. Every hypothesis looks at a particular relationship between variables and provides information on the estimated coefficient, p-value, and statistical significance of the relationship to see if the hypothesis is supported.

The first six hypotheses are supported, indicating significant positive relationships. Specifically, social presence (SP) has a strong and significant impact on knowledge sharing (K.Sh) (Estimate = 0.698, $p = 0.000$), and virtual leadership (VL) also positively influences knowledge sharing (Estimate = 0.187, $p = 0.007$). Furthermore, knowledge sharing significantly impacts virtual team performance (VTP) (Estimate = 0.461, $p = 0.000$). Both social presence (Estimate = 0.320, $p = 0.000$) and virtual leadership (Estimate = 0.160, $p = 0.006$) directly and positively influence virtual team performance. Additionally, knowledge sharing mediates the relationship between social presence and virtual team performance (Estimate = 0.355, $p = 0.001$). However, the last three hypotheses are not supported. The mediating effect of knowledge sharing between virtual leadership and virtual team performance

(Estimate = 0.090, $p = 0.071$) is not significant. Moreover, the moderation effect of media richness (MR) on the relationship between social presence and virtual team performance (Estimate = -0.027, $p = 0.383$), as well as between virtual leadership and virtual team performance (Estimate = -0.002, $p = 0.961$), is not statistically significant. Table 4.52 presents a summary of the research findings.

Table 4.52 Summary of Research Findings

Hypothesis	Relationships	Estimate	P-Value	Assessment
1	SP → K.Sh	0.698	.000	Supported
2	VL → K.Sh	0.187	.007	Supported
3	K.Sh → VTP	0.461	.000	Supported
4	SP → VTP	0.320	.000	Supported
5	VL → VTP	0.160	.006	Supported
6	SP → K.Sh → VTP	0.355	.001	Supported
7	VL → K.Sh → VTP	0.090	.071	Not Supported
8	SP → VTP Moderating by MR	-.027	.383	Not Supported
9	VL → VTP Moderating by MR	-.002	.961	Not Supported

4.14 CHAPTER SUMMARY

The fourth chapter presents a review of the study's findings. The following stages of the research were completed: Following a comprehensive examination of every stage of the data collection procedure, the data was processed and examined for outliers and missing values. The assumptions of the study were then tested, namely the tests for normal distribution, linearity, homoscedasticity, multicollinearity, and lack of correlated errors. Split-half and Cronbach's alpha coefficient were also used to assess the study tool's validity. A descriptive analysis of the study sample was then carried out. The next step involved conducting EFA and CFA. After confirming the goodness indicators for the pooled measurement model and testing its convergent and discriminant validity, the study proceeded to the path analysis test, where the study hypotheses were tested and the hypothesis testing was carefully examined to address the research questions.

CHAPTER FIVE

DISCUSSIONS AND CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter provides an explanation of interpreting the complex dynamics in virtual teams by understanding the role of team members' social presence, virtual leadership, and knowledge sharing in virtual team performance with the aim of providing comprehensive insights into how these factors interact, as well as by knowing the role of media richness in this role. This chapter attempts to explain the basic mechanisms that improve team performance in virtual environments by employing relevant theories such as SPT, SLT, SET, and MRT theories to understand the relationship between social presence, virtual leadership, and knowledge sharing and their impact on the performance of virtual teams in the context of higher education.

This chapter highlights the critical role that social interactions, effective leadership, and knowledge sharing play in enhancing the performance of virtual teams. It does this by highlighting significant positive relationships between different factors through careful statistical analyses and interpretation of results. The chapter also shows the theoretical and practical applications of the current study. In addition, this chapter also acknowledges the limitations of the study and suggests interesting directions for further investigation, opening the door to better knowledge of virtual team dynamics and the creation of empirically supported plans for organizational success in remote work environments.

5.2 DISCUSSION OF FINDINGS

5.2.1 Discussion of Research Question 1

Research Question 1 has been stated as the following “What is the influence of social presence practices (relationship building, cohesion, trust, and communication) on knowledge sharing among administrators at HEIs Malaysia?” To answer this question

hypothesis 1 has been tested “H1: *There is a significant positive relationship between social presence Practices (Relation building, Trust, Cohesion, and Communication) and knowledge sharing among administrators at HEIs Malaysia*”. The findings from testing Hypothesis 1 revealed a noteworthy positive correlation between social presence and knowledge sharing, demonstrating high levels of significance that corroborate the hypothesis.

The findings of the current study are consistent with earlier research. Previous research has indicated a relationship between knowledge sharing and social presence activities, such as relationship building, trust, cohesiveness, and communication H1. In specifics, previous research has shown a correlation between knowledge sharing and relationship building (Zheng *et al.*, 2021; Waititu & Barker, 2023). Furthermore, trust is correlated with knowledge sharing according to prior empirical studies (Kmieciak, 2020; Masood *et al.*, 2023; Almadana *et al.*, 2022; Lee *et al.*, 2020). Moreover, according to Rossignoli *et al.* (2023); Birhanu and Gugssa (2024); and Wojciechowska-Dzięcielak (2020), cohesiveness is correlated with knowledge sharing. In addition, according to several studies such as (Koo *et al.*, 2022; Masood *et al.*, 2023; Kim *et al.*, 2021; Fang *et al.*, 2024; Lee *et al.*, 2020), communication and knowledge sharing are correlated.

SPT theory is consistent with the results of the current study, which indicated a noteworthy positive association between social presence and knowledge sharing. SPT theory claims that people are more likely to share knowledge in a collaborative social environment. This suggests that a vibrant social environment increases the likelihood of knowledge sharing because it creates an atmosphere in which people feel comfortable and inspired to share their knowledge and interact with each other.

The results of the descriptive analysis also indicate a high arithmetic mean for each of the variables: trust 4.12, building relationships 4.11, communication 4.08, and cohesion 4.07 (refer to table 4.15), all of which indicate a high rate of approval by the participants, which indicates a high level of social presence among members of virtual teams, which explains the positive role of presence. Social with knowledge sharing according to SPT theory.

5.2.2 Discussion of Research Question 2

Research Question 2 has been stated as the following “Is there a significant influence of virtual leadership on knowledge sharing among administrators at HEIs Malaysia?”. To answer this question hypothesis 2 has been tested “**H2: There is a significant positive relationship between virtual leadership and knowledge sharing among administrators at HEIs Malaysia**”. The examination of Hypothesis 2, exploring the correlation between virtual leadership and knowledge sharing, unveils convincing data that aligns with the hypothesis. It can be deduced that a notable positive association exists between virtual leadership and knowledge sharing within the research scope.

The findings of the current study are consistent with earlier research such as (Khatoon *et al.*, 2022; Singh *et al.*, 2021; Yin *et al.*, 2023; Anis *et al.*, 2021; Martela, 2020). Previous literature highlights a relationship between virtual leadership and knowledge sharing within virtual team settings. Prior studies suggest that with adequate support and time, virtual teams have the potential to interact more effectively than traditional teams. Consequently, successful management of virtual teams and promotion of knowledge sharing hinge upon effective leadership in virtual settings (Singh, 2021). Furthermore, leadership within virtual teams plays a pivotal role in fostering the development of shared mental models and facilitating knowledge exchange (Morrison-Smith & Ruiz, 2020).

SLT theory supports the results of the study, which demonstrated a positive relationship between knowledge sharing and virtual leadership. Within the framework of SLT theory, virtual leadership focuses on using technology to create a knowledge-sharing friendly communication environment, foster trust even in the face of geographic distance, increase transparency, and enhance knowledge sharing among team members.

In addition, the results of the descriptive analysis indicate a high arithmetic mean for each of the variables: virtual leadership 4, knowledge sharing 3.96 (see Table 4.15), all of which indicate a high percentage of approval by participants, which indicates a high level of successful virtual leadership among team members, which

explains the positive role of virtual leadership with knowledge sharing according to SLT theory.

5.2.3 Discussion of Research Question 3

Research Question 3 has been stated as the following “Is there a significant influence of knowledge sharing on virtual teams' performance among administrators at HEIs Malaysia?”. To answer this question hypothesis 3 has been tested “**H3:** *There is a significant positive relationship between knowledge sharing and virtual teams' performance among administrators at HEIs Malaysia*”. The evaluation of Hypothesis 3, delving into the correlation between knowledge sharing and virtual teams' performance, presents compelling evidence affirming the hypothesis. Hence, drawing from these findings, it can be inferred that a meaningful positive link exists between knowledge sharing and virtual teams' performance within the research framework.

The findings of the present study align with earlier research. For instance, prior studies have highlighted the correlation between knowledge sharing and virtual team performance. Previous research has concluded that sharing knowledge enhances the performance of virtual teams (Natu & Aparicio, 2022). Additionally, it has been established that knowledge sharing is a crucial component of team performance, particularly in the context of GVTs (Davidaviciene *et al.*, 2020), suggesting that the success or failure of virtual team performance may be significantly influenced by knowledge sharing (Al Kaabi *et al.*, 2022). Virtual teams tend to engage more in tasks requiring knowledge sharing and exchange, underscoring the importance of beliefs in information sharing, communication, and collaboration among team members over time (Chung *et al.*, 2022). In the virtual realm, knowledge sharing is vital for fostering creativity, problem-solving, and decision-making, thus essential for achieving success (Swart *et al.*, 2022). Consequently, the absence of effective knowledge sharing negatively impacts the performance of virtual teams (Davidaviciene *et al.*, 2020).

SET theory supports the research result that demonstrated a positive relationship between knowledge exchange and virtual team performance. According to SET theory, exchanging vital information between team members enhances team cohesion, trust, and problem-solving capabilities through cooperation and creativity, which ultimately leads to better team performance.

In addition, the results of the descriptive analysis indicate a high arithmetic mean for each of the variables: knowledge sharing 3.96, virtual team performance 4 (refer to Table 15.4), all of which indicate a high percentage of agreement by the participants, which indicates a high level of knowledge sharing among team members, which explains the positive role of knowledge exchange on virtual team performance according to SET theory.

5.2.4 Discussion of Research Question 4

Research Question 4 has been stated as the following “What is the influence of social presence practices (relationship building, cohesion, trust, and communication) on virtual teams’ performance among administrators at HEIs Malaysia?” To answer this question hypothesis 4 has been tested “**H4:** *There is a significant positive relationship between social presence and virtual teams’ performance among administrators at HEIs Malaysia*”. The examination of Hypothesis 4, which explores the connection between social presence and virtual teams’ performance, provides compelling evidence endorsing the hypothesis. Therefore, drawing from these findings, it can be deduced that a notable positive correlation exists between social presence (Relationship building, Cohesion, Trust, and Communication) and virtual teams’ performance within the research context.

The findings of the present study align with earlier research. Prior research suggests that social presence (communication, trust, cohesiveness, and relationship building) among team members enhanced the performance of virtual teams. In specifics, prior empirical research has shown that developing relationships has an impact on the success of virtual teams (Tan *et al.*, 2019; Lin *et al.*, 2008; Aarthi &

Sujatha, 2022). According to Turesky *et al.* (2020); Ben Sedrine *et al.* (2020); Zaharie (2021); Kashive *et al.* (2022); Sagar *et al.* (2023); Yun *et al.* (2020); AlMarar *et al.* (2021); and Jafari (2021), trust also affects virtual team performance. Moreover, according to Holle (2021); Ben Sedrine *et al.* (2020); Chaudhary *et al.* (2022); Ghanbari (2022); and Sinz (2020), cohesiveness has an impact on virtual team performance. Furthermore, the performance of virtual teams is also impacted by communication (AlMarar *et al.*, 2021; Miaohui *et al.*, 2022.; Halim *et al.*, 2021; Semvua *et al.*, 2024; Arifin *et al.*, 2022).

SPT theory supports the results of the current study showing a positive relationship between social presence and the performance of virtual teams. According to SPT theory, virtual teams are more likely to perform well when they build strong bonds, maintain cohesion, build trust, and enable effective communication. Therefore, our findings attest to the importance and effectiveness of social presence techniques in increasing the performance of virtual teams.

The results of the descriptive analysis also indicate a high arithmetic mean for each of the variables: trust 4.12, building relationships 4.11, communication 4.08, and cohesion 4.07 (see Table 4.15), all of which indicate a high percentage of approval by the participants, which indicates a high level of social interactions between members of virtual teams, which explains the positive role social presence with virtual teams performance.

5.2.5 Discussion of Research Question 5

Research Question 5 has been stated as the following “Is there a significant influence of virtual leadership on virtual teams' performance among administrators at HEIs Malaysia?”. To answer this question hypothesis 5 has been tested “**H5:** *There is a significant positive relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia*”. The examination of Hypothesis 5, delving into the correlation between virtual leadership and virtual teams' performance, provides substantial backing for the hypothesis. Consequently,

drawing from these findings, it can be inferred that a meaningful positive association exists between virtual leadership and virtual teams' performance within the research framework.

The findings of the present study are consistent with previous research. Team effectiveness is impacted by virtual leaders' ability to effectively communicate with one another through virtual platforms. This implies that modern leaders need to be knowledgeable about digital communication (Wahab *et al.*, 2023). Additionally, the performance of the virtual team as a whole is impacted by e-leadership (Kashive *et al.*, 2022). Perceived e-leadership, which includes a leader's attitude, communication/coordination, and trustworthiness, also has a substantial impact on virtual team performance (Elyousfi *et al.*, 2021). Furthermore, the study's conclusions demonstrate that effective leadership can have a positive effect on the performance of virtual teams (Zhang *et al.*, 2022). Furthermore, the virtual leadership techniques used by the leaders have improved employee performance. The study's findings supported the importance of virtual leadership strategies for employee performance and work engagement (Zaw, 2022).

SLT theory supports the results of the current study, which confirmed that there is a positive relationship between successful virtual leadership and the performance of virtual teams. According to SLT theory, a situational virtual leader style is appropriate for a virtual environment, because leaders need to change their leadership style to be successful in a virtual environment (Clark, 2019). In a virtual environment, employees can be exposed to more technological challenges and team collaboration. Here the virtual leader uses the situational approach to overcome these challenges (Morrison-Smith & Ruiz, 2020).

In addition, the results of the descriptive analysis indicate a high arithmetic mean for each of the variables: virtual leadership 4, the performance of virtual teams 4 (see Table 15.4), all of which indicate a high percentage of agreement by the participants, which indicates the presence of a high level of virtual leadership. Success among team members, which explains the positive role of virtual leadership in the performance of virtual teams according to SLT theory.

5.2.6 Discussion of Research Question 6

Research Question 6 has been stated as the following “Does knowledge sharing mediate the relationship between social presence and virtual team performance among administrators at HEIs Malaysia?”. To answer this question hypothesis 6 has been tested “**H6:** *The relationship between social presence and virtual teams’ performance is mediated by knowledge sharing among administrators at HEIs Malaysia*”. The analysis of Hypothesis 6, which explores the mediating role of knowledge sharing in the relationship between social presence and virtual teams' performance, reveals compelling evidence supporting the hypothesis. These findings suggest that the relationship between social presence and virtual teams' performance is indeed mediated by knowledge sharing. In other words, social presence influences virtual teams' performance both directly and indirectly through its impact on knowledge sharing.

Research Question 6 in the current study “Does knowledge sharing mediate the relationship between social presence and virtual team performance?” It has not been tested in previous studies. Therefore, the current study filled this knowledge gap by testing H6, which was confirmed through empirical testing in the current study.

However, previous empirical studies have confirmed the existence of an effect of social presence on knowledge sharing **H1** (Zheng *et al.*, 2021; Waititu & Barker, 2023; Sabetzadeh & Chen, 2023; Kmiecik, 2020; Masood *et al.*, 2023; Almadana *et al.*, 2022; Lee *et al.*, 2020; Rossignoli *et al.*, 2023; Birhanu & Gugssa, 2024; Wojciechowska-Dzięcielak, 2020; Koo *et al.*, 2022; Masood *et al.*, 2023; Kim *et al.*, 2021; Fang *et al.*, 2024; Lee *et al.*, 2020). Moreover, it confirmed that knowledge sharing affects the performance of virtual teams **H3** (Natu & Aparicio, 2022; Davidaviciene *et al.*, 2020; Al Kaabi *et al.*, 2022; Chung *et al.*, 2022; Swart *et al.*, 2022). Therefore, it was expected that knowledge sharing might mediate the relationship between social presence and the performance of virtual teams, and this was confirmed in the current study in the **H6**.

SPT theory and SET theory support the results of the current study, as it was shown that social presence increases the level of knowledge sharing **H1**, and this in turn leads to enhancing the performance of virtual teams **H3**. The previous finding highlights the critical role of knowledge sharing as a mechanism through which social presence enhances the performance of virtual teams. Such insights can inform strategies aimed at enhancing collaboration and knowledge sharing within virtual team environments, ultimately contributing to improved team effectiveness and outcomes.

The results of the descriptive analysis also indicate a high arithmetic mean for each of the variables: trust 4.12, building relationships 4.11, communication 4.08, and cohesion 4.07 (see Table 4.15), all of which indicate a high percentage of approval by the participants, which indicates a high level of social interactions between members of virtual teams led to knowledge exchange according to SPT theory. On the other hand, the results of the descriptive analysis indicate a high arithmetic mean for each of the variables: knowledge sharing 3.96, virtual team performance 4 (see Table 4.15), all of which indicate a high percentage of participants' agreement, which indicates a high level of knowledge sharing which lead to improving the performance of the virtual team according to SET theory. As a result, knowledge sharing played a mediating role in the relationship between social presence and the performance of virtual teams.

5.2.7 Discussion of Research Question 7

Research Question 7 has been stated as the following “Does knowledge sharing mediate the relationship between virtual leadership, and virtual team performance among administrators at HEIs Malaysia?”. To answer this question 7 has been tested “**H7: The relationship between virtual leadership and virtual teams' performance is mediated by knowledge sharing among administrators at HEIs Malaysia**”. The examination of Hypothesis 7 explores the intermediary function of knowledge sharing in the association between virtual leadership and virtual teams' performance. The results indicate that while virtual leadership has a direct impact on virtual teams' performance, the indirect influence through knowledge sharing lacks statistical

significance. These results imply that although virtual leadership directly affects the performance of virtual teams, its impact on performance is not substantially mediated by knowledge sharing. This underscores the necessity for additional investigation into the mechanisms by which virtual leadership influences team performance in virtual environments.

Research Question 7 in the current study “Does knowledge sharing mediate the relationship between virtual leadership, and virtual team performance among administrators at HEIs Malaysia?” It has not been tested in previous studies. Therefore, the current study filled this knowledge gap by testing **H7**. However, previous empirical studies have confirmed the existence of an effect of virtual leadership on knowledge sharing **H2** (Khatoon *et al.*, 2022; Singh *et al.*, 2021; Yin *et al.*, 2023; Anis *et al.*, 2021; Martela, 2020). Moreover, it confirmed that knowledge sharing affects the performance of virtual teams **H3** (Natu & Aparicio, 2022; Davidaviciene *et al.*, 2020; Al Kaabi *et al.*, 2022; Chung *et al.*, 2022; Swart *et al.*, 2022). Therefore, it was expected that knowledge sharing might mediate the relationship between virtual leadership and the performance of virtual teams, and this was tested in the current study in the **H7**.

By studying the mediating function of knowledge sharing in the relationship between virtual leadership and virtual team performance, the study's findings add to the body of research already in existence. Although prior research has demonstrated the direct impacts of virtual leadership on knowledge sharing **H2** and knowledge sharing on the performance of virtual teams **H3**, this study was the first to examine the mediation role of knowledge sharing **H7**. While it was established that virtual leadership directly affects virtual team performance **H5**, the findings indicate that knowledge sharing does not substantially mediate this relationship **H7**. These results provide light on possible directions for future research in this area and emphasise the need for more investigation of the complex mechanisms through which virtual leadership affects team performance in virtual environments.

The failure to support the seventh hypothesis can be justified as follows: Virtual environments pose unique challenges that may hinder the effective flow of

knowledge among members of virtual teams. Technical barriers, cultural differences, and so on may explain why knowledge sharing does not mediate the relationship between virtual leadership and team performance.

1. Technical Diversity

Virtual environments rely heavily on technological tools for communication and collaboration. However, some teams may experience technical issues that impact the effective flow of information. For example, poor internet connectivity or complexities in using virtual collaboration platforms may hinder the easy exchange of knowledge among team members, reducing the likelihood that knowledge sharing will play a mediating role between leadership and performance.

The results of the current study in Table 4.14 presents an intricate view of diversity within a team across several dimensions. The information supplied demonstrates several characteristics of diversity in an environment, such as and diversity in digital media, ICT experience. When it comes to the diversity of digital media, the most frequently used type is multimedia (54.7%), which is followed by text-based (23.5%), audio-based (18.6%), and video-based (3.2%). Experience in ICT shows a fairly distributed diversity, with the highest frequency in the 5-10 years range (30.7%), followed closely by 11-15 years (28.8%), and decreasing thereafter. Therefore, it can be said that there is a diversity of technology tools that has caused difficulty in the flow of information between team members.

2. Cultural Diversity

Virtual teams may be multicultural, leading to differences in the ways they communicate and understand knowledge. Some members may feel uncomfortable sharing knowledge due to cultural differences. For example, some cultures may be more conservative in sharing ideas, while others rely on continuous and open interaction. These differences may hinder the mediating effect of knowledge sharing.

The results of the current study indicate cultural diversity among administrators in the Malaysian higher education sector. For instance, Table 4.13 shows a

comprehensive overview of cultural diversity within the surveyed group across various categories. First off, when it comes to nationality diversity, only 0.8% of respondents are not Malaysian, with the vast majority (99.2%) being Malaysian. Regarding linguistic diversity, the research shows that respondents primarily use English (43.4%) and Malay (55%) among themselves. The percentage of Indian language speakers in this dataset is 1.3%, whereas the percentages for Chinese and other languages are negligible or absent. Moreover, Table 4.13 shows a comprehensive overview of cultural diversity within the surveyed group across various categories. First off, when it comes to nationality diversity, only 0.8% of respondents are not Malaysian, with the vast majority (99.2%) being Malaysian. Regarding linguistic diversity, the research shows that respondents primarily use English (43.4%) and Malay (55%) among themselves. The percentage of Indian language speakers in this dataset is 1.3%, whereas the percentages for Chinese and other languages are negligible or absent.

5.2.8 Discussion of Research Question 8

Research Question 8 has been stated as the following “Does media richness moderate the relationship between social presence practices (relationship building, cohesion, trust, and communication) and virtual teams’ performance among administrators at HEIs Malaysia?”. To answer this question hypothesis 8 has been tested “**H8: The relationship between social presence practices and virtual team performance is moderated by media richness among administrators at HEIs Malaysia**”. Research Question 8 in the current study has not been tested in previous studies. Therefore, the current study filled this knowledge gap by testing **H8**. The results suggests that media richness does not significantly moderate the relationship between social presence practices and virtual team performance.

Prior literature mentioned that virtual teams will differ in their outcomes just as much as they differ in the communication media they employ According to (Marques-Quinteiro *et al.*, 2022), for example, the higher the degree of synchronisation and media richness of the communications medium, the more successful the communication. Conversely, when the level of media richness of means

of communication between team members is low, this may decrease the social presence of team members and thus decrease the performance of the virtual team. For instance, Team reflexivity is likely to have a negative impact on improving team performance if the virtual environment does not offer as rich media to show cues as F2F situations (Marques-Quinteiro *et al.*, 2022).

MRT theory did not support the results of the current study. It is expected that media richness will play a moderating role on the relationship between social presence and the performance of virtual teams, but testing this hypothesis in the current study was not supported. However, the effect of social presence on virtual performance differs at the highest and lowest levels of media richness, these differences were not statistically significant.

There might be reasonable justification for not supporting MRT theory for the results of the current study. It should be noted that MRT theory was tested in the context of GVT in prior literature where the employee works by using virtual methods only (Exclusively Virtual Team), and therefore the level of social presence and its effect on virtual team performance will differ depending richness of the means of communication. While in the current study, the employees work by using both methods Virtual and Hybrid (Slightly Virtual Team). For instance, in the current study, the results of the descriptive analysis show that even during COVID-19, it was found that there are virtual teams working in a hybrid way 70.1% (F2F Method, Virtual Method), and 29.9% working in a virtual method only. Therefore, it turns out that there are virtual teams that are not greatly influenced by the media richness.

The type of virtual teams adopted in the current study is the teams called Slightly Virtual Teams (refer to Table 2.5), which are defined according to Wadsworth and Blanchard (2015) as "The slightly virtual team is similar to a traditional team with constant face-to-face communication but also works and communicates via the use of ICTs Communication is mostly face to face" (Agbi, 2018). Hence, the results of the study are consistent with the operational definition of the Slightly Virtual Teams that were adopted in the current study.

There might be another reasonable reason why virtual teams are not affected by media richness. The current study adopted the national virtual team's (National VTs) type, while previous studies adopted Global VT (refer to Table 2.5). According to Maznevski and Chudoba (2000), the difference between the two types is as follows: "Global VTs consist of members who work and live in different countries, while National VTs consist of members geographically dispersed in the same country and similar cultural environments" (Han *et al.*, 2020). Therefore, there may be great opportunities for local teams to communicate in different ways while working, whether by ICT or in other personal ways, such as meeting F2F.

5.2.9 Discussion of Research Question 9

Research Question 9 has been stated as the following "Does media richness moderate the relationship between virtual leadership and virtual teams' performance among administrators at HEIs Malaysia?". To answer this question hypothesis 9 has been tested "**H9**: *The relationship between virtual leadership and virtual team performance is moderated by media richness among administrators at HEIs Malaysia*". Research Question 9 in the current study has not been tested in previous studies. Therefore, the current study filled this knowledge gap by testing **H9**. The results suggest that media richness does not significantly moderate the relationship between virtual leadership and virtual team performance.

However, MRT theory argues that a leader's power to influence the team through verbal and nonverbal signals would increase with the media richer (Ben Sedrine *et al.*, 2020). Conversely, when the level of media richness of means of communication between team members is low, this may decrease the effect of virtual team leadership on the performance of the virtual team. For instance, insufficient media richness makes it difficult for the transformative leader to foster cooperation (Ben Sedrine *et al.*, 2020).

The study's conclusions provide insightful information on the intricate dynamics of virtual team leadership and how media richness affects team success.

This study addresses a major gap in the literature by investigating the moderating influence of media richness, a component that has not been examined in earlier research. The results show that media richness does not significantly moderate the relationship between virtual leadership and team performance, which is contrary to expectations based on MRT theory, which predicts that greater richness boosts a leader's ability to influence team dynamics.

As the study mentioned in the previous justification, there may be a reasonable justification for the MRT theory not being supported by the results of the current study. It should be noted that the MRT theory has been tested in the context of Global virtual team in previous literature, where the employee works using virtual methods only (Exclusively Virtual Team), and therefore the level of impact of virtual leadership on the performance of the virtual team will vary according to the richness of means of communication. In the current study, the employee works using both virtual and hybrid methods (Slightly Virtual Team). For example, in the current study, the results of the descriptive analysis showed that even during the COVID-19 crisis, it was found that there were 70.1% virtual teams working in a hybrid manner (F2F method, Virtual method), and 29.9% working in a virtual method only. Therefore, it turns out that the performance of virtual teams is not greatly affected by media richness.

5.3 CONTRIBUTION ON THEORETICAL LEVEL

Overall, the research makes a significant theoretical contribution by deepening our comprehension of the intricate relationships between social presence, virtual leadership, knowledge sharing, and team performance in virtual environments. This helps practitioners and scholars working in the field of virtual team management and collaboration to make informed decisions. This is done by providing a more comprehensive understanding of the performance of virtual teams by combining several theories, such as Media Richness Theory (MRT), Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET) theories, which helped to provide a more comprehensive and broader understanding

from this perspective. Based on the results of the current research, the theoretical contribution lies in several key areas:

First, comprehending how social presence practices affect information sharing knowledge sharing and social presence activities including (relationship building, cohesion, trust, and communication) are significantly positively correlated, according to the research. This emphasises how important social connections are for promoting information sharing within organizations. The results advance our theoretical understanding of how interpersonal dynamics impact the behaviours associated with knowledge sharing.

Second, the study indicates a noteworthy affirmative correlation between virtual leadership and knowledge sharing, as well as between virtual leadership and virtual teams' performance. This brings us to our second point: understanding the impact of virtual leadership on knowledge sharing and virtual teams' performance. This highlights the significance of proficient leadership in virtual contexts and the part virtual leaders play in creating atmospheres that encourage information exchange and improve team productivity. These results add to the body of knowledge regarding leadership in virtual environments.

Third, confirming the significance of knowledge sharing for the effectiveness of virtual teams: The study demonstrates a strong positive correlation between knowledge sharing and the performance of virtual teams. This emphasises how important knowledge exchange is to improving team performance in remote work settings. These results highlight the importance of knowledge sharing systems for reaching desired performance outcomes, which adds to the body of literature on virtual teams.

Fourth, looking at knowledge sharing's mediating role: This study explores how knowledge sharing mediates the relationships among social presence, virtual leadership, and the performance of virtual teams. It uncovers strong evidence in favour of the mediating role of information sharing, showing that virtual leadership and social presence affect knowledge sharing and, thus, affect team performance in

both direct and indirect ways. These revelations advance our knowledge of the processes by which leadership actions and social interactions impact the effectiveness of teams operating in remote settings.

Fifth, investigating the moderating role of media richness: these findings add to our understanding of how communication technologies may or may not affect the efficacy of social interactions and leadership behaviours in virtual teams, even though the research does not find significant moderation effects of media richness on the relationships between social presence practices, virtual leadership, and virtual teams' performance. The reason may be that the current study adopts the national concept of virtual teams, and the results of the study showed that they work in hybrid ways in addition to virtual work.

5.4 CONTRIBUTION ON THE PRACTICAL LEVEL

Overall, the practical implications of the study provide universities with valuable insights into increasing the effectiveness of their virtual teams, enhancing knowledge dissemination, and ultimately raising team performance within virtual work environments. In detail, the practical implications of the study are as follows:

First, improving organisational practices: based on the research, universities can create and put into action plans to promote social presence behaviours among members of virtual teams, such as communication, cohesion, and relationship development. Universities can foster a knowledge-sharing atmosphere that fosters enhanced team performance by giving priority to certain practices.

Second, leadership development programs: universities might spend money on leadership development initiatives designed specifically for virtual leaders. Programs of this kind might concentrate on giving virtual leaders the abilities and know-how needed to manage virtual teams, promote knowledge sharing, and improve team performance. Modules on relationship development, communication tactics, and virtual team management approaches can be included in training programmes.

Third, encouraging a culture of knowledge sharing: after realising how critical knowledge sharing is to the effectiveness of virtual teams, companies can launch programmes to encourage a culture of knowledge sharing. This can involve setting up virtual knowledge-sharing meetings, developing platforms for the exchange of best practices, and offering incentives or prizes to staff members who actively participate in knowledge-sharing initiatives. Universities can spend money on platforms and technology that promote knowledge exchange, communication, and cooperation among members of virtual teams. Universities may help virtual teams share information and improve team performance by giving them access to resources like instant messaging, video conferencing, and document sharing platforms.

Fourth, performance evaluation and feedback mechanisms: performance evaluation frameworks for virtual teams and leaders might include metrics related to social presence, knowledge exchange, and virtual leadership effectiveness. By keeping an eye on these factors and offering input, universities may pinpoint areas that need work and offer focused assistance to boost team performance.

Fifth, cross-functional cooperation: by realising how social presence, virtual leadership, knowledge sharing, and team performance interact, organisations can support efforts aimed at knowledge exchange and cross-functional cooperation. Universities can harness multiple viewpoints and expertise to create innovation and achieve organisational goals by promoting collaboration among several departments or teams.

Overall, a substantial theoretical advancement can be seen in the evolution of the theoretical framework from Tan *et al.* (2019) to the current study (2024). In order to provide a more complete picture of the factors influencing virtual team performance, the independent variables have been extended from those that are only related to social presence, such as trust, communication, relationship building, cohesion, reward, and coordination, to include virtual leadership, knowledge sharing, and media richness. Furthermore, the R² value has improved from 0.503 in the prior study, which indicated a lower-quality model, to 0.77625 in the current study, which indicates a higher-quality model in which the new variables account for 77.625% of

the variance in team performance. This suggests that the model's explanatory capacity is enhanced by the theoretical additions.

In order to provide a more thorough explanation of the results, the theoretical framework has also changed from depending just on Media Richness Theory (MRT) to incorporating other theories, such as Social Presence Theory (SPT), Situational Leadership Theory (SLT), and Social Exchange Theory (SET). Additionally, the context has changed from the manufacturing sector to the higher education sector, which improves the results' generalizability. All of these advancements add to a more thorough theoretical comprehension of virtual team effectiveness in many contexts. Table 5.1 shows the developing theoretical framework.

Table 5.1 Developing a Theoretical Framework

	Tan <i>et al.</i> (2019)	Current study (2024)
Predictors	1. IVs: Social Presence: (Trust, Communion, Relation building, Cohesion, Reward, Coordination). 2. DV: Virtual Team Performance	1. IVs: Social Presence (Trust, Communion, Relation building, Cohesion), Virtual leadership, Knowledge Sharing, Media Richness. 2. DV: Virtual Team Performance.
R2	R2 = 0.503	R2 = 0.77625
Variance in Team Performance	1. R2 Indicating 50.3 % of the variance in team performance can be explained by significant factors. 2. R2 < 0.6 (Social Sciences) indicated the low quality of the study model (Hair Jr <i>et al.</i> , 2014).	1. R2 Indicating 77.625 % of the variance in team performance can be explained by significant factors 2. R2 > 0.6 (Social Sciences) indicated the high quality of the study model (Hair Jr <i>et al.</i> , 2014).
Theories	Media Richness Theory (MRT)	1. Media Richness Theory (MRT) 2. Social Presence Theory (SPT) 3. Situational Leadership Theory (SLT) 4. Social Exchange Theory (SET)
Context	1. Manufacturing	1. Higher Education Sector

5.5 CONTRIBUTION ON THE POLICYMAKERS LEVEL

It is worth noting that there is a plan for the MEH in Malaysia to lead the shifts of Malaysian higher education from 2015 to 2025. According to MEBHE (2015-2025), there are ten plans for shifts in Malaysian higher education, namely; 1. Holistic, Entrepreneurial, and Balanced Graduates. 2. Talent Excellence. 3. Nation of Lifelong Learners. 4. Quality TVET Graduates. 5. Financial Sustainability. 6. Empowered Governance. 7. Innovation Ecosystem. 8. Global Prominence. 9. Globalised Online Learning. 10. Transformed HE Delivery. The results of the current study are consistent with some of the objectives of this plan. It also highlights other important goals that were not included among the ten goals of the Malaysian Ministry of Higher Education.

The results of the current study contribute to decision makers in several ways. Firstly, the Malaysian education plans MEBHE (2015-2025) appear to be promising and contribute to achieving an advanced status for MHE. However, there do not appear to be plans that include the management of Malaysian education during crises, as happened in the COVID-19 crisis, which caused confusion in the Malaysian education sector. Therefore, the current study presents a new vision that helps decision-makers in the Malaysian Ministry of Education to adopt alternative plans in the event of crises, including employing virtual teams to manage education during crises.

Secondly, with the support of the study's findings, using virtual teams to oversee the provision of Malaysian distance education services, decision makers in the country's higher education sector can plan to expand the targeted Malaysian education market to other worldwide markets. Especially considering that a large number of Malaysian universities have been successful in overseeing higher education and making sure that their services are still offered to foreign students while they are in their nations during the COVID-19 time. This is consistent with the Malaysian Higher Education Plan (MEBHE, 2015-2025) specifically, goal No 8 (Global Prominence), which aims to attract 250,000 foreign students by 2025 and internationalize Malaysian education (Ministry of Education Malaysia, 2015). Notably, approximately 32,000 foreign students were enrolled at Malaysian universities in 2004. That number more

than tripled to almost 108,000 students enrolled in HLIs by 2014 (Ministry of Education Malaysia, 2015).

Third, the current study provides a new insight into the remote delivery of Ministry of Higher Education services in Malaysia using virtual telework teams. This trend is consistent with MEBHE (2015-2025) in terms of employing technological advances to improve performance and leveraging the positive attributes of the goal of virtual teams to deliver distance education No. 9 (global online learning). Therefore, decision makers in Malaysia can plan to raise the level of performance in the higher education sector. Malaysia wants to be a globally recognized hub for education, backed by global online learning (GOL) platforms. Access to the international community will be enhanced by these platforms. They will enhance Malaysia's reputation in the world of education (Ministry of Education Malaysia, 2015).

Fourth, the current study offers a new perspective on the use of virtual teams—not just in times of crisis like COVID-19, but even afterward. This is because the study's findings indicate that 49.9% of administrative staff members in Malaysian education sector work in a hybrid manner, which combines traditional face-to-face work with virtual and remote work even after COVID-19. Additionally, the results indicate that 7% of administrative staff members operate entirely virtually. As a result, policymakers in the education sector in Malaysia are now able to develop plans to modify working practices to embrace virtual working in response to changes in the international education market, improving international competition and expanding the Malaysian education market internationally. Again, this is consistent with MEBHE (2015-2025) specifically, goal No 8 (Global Prominence).

5.6 RESEARCH LIMITATIONS AND RECOMMENDATIONS

The validity, reliability, and applicability of findings in comprehending the dynamics of virtual teams, leadership, and knowledge sharing in organisational settings can be strengthened by addressing the constraints in subsequent study. The present study, while valuable, is subject to a number of limitations and future directions.

Generalizability: It's possible that not all organisational contexts or industries will be able to completely apply the findings. The study's focus on particular industries (Higher education sector), team configurations, or organisational structures may have limited the findings' generalizability. The scope of generalization can be expanded by testing the study model in other service sectors such as the health sector, logistics, banks...etc.

Cross-Sectional Design: the current study adopted a cross-sectional design; it might make it more difficult to determine outcomes in the long run. Longitudinal designs may help confirm the study's conclusions by offering more convincing proof of causality. Thus, examining the relationships over time between virtual leadership, social presence, knowledge sharing, and team performance through longitudinal studies would yield more convincing proof of causation and shed light on the dynamics of these relationships at various phases of team development.

Moderators and Moderation Analyses: Although the study looks at the moderating effect of media richness, and the mediating effect of knowledge sharing various outcomes might obtained from other moderating and mediating variables. Hence, exploring alternative mediators and moderators in future studies might look into different mechanisms and contextual factors that might have an impact on the connections between social presence, virtual leadership, and team performance. The current study looks at knowledge sharing as a mediator and media richness as a moderator. This may involve elements like corporate culture.

Contextual factors: It is possible that some relevant contextual variables may be overlooked which can affect how the variables relate to each other in the study. Factors may include team dynamics, team conflict, organizational culture, and team diversity.

Mixed-Methods Approaches: Combining quantitative analysis with qualitative techniques, like focus groups or interviews, can provide a deeper understanding of the underlying mechanisms and external factors affecting the correlations between the

variables. Qualitative information can supplement quantitative results and offer a more thorough comprehension of the phenomenon being studied.

Cross-Cultural Studies: studying how social presence, virtual leadership, information sharing, and team performance change in various cultural contexts might help us better understand these phenomena. This is known as cross-cultural studies. The efficiency of leadership and the dynamics of virtual teams can be influenced by cultural characteristics that can be found through cross-cultural studies.

Scholars can further our understanding of virtual teams, leadership, and knowledge sharing by addressing these study horizons and directions. They can also aid in the creation of evidence-based management and leadership strategies for virtual teams.

5.7 CHAPTER SUMMARY

The study's analysis chapter concludes that there is a strong correlation between a number of variables pertaining to virtual teams including social presence, virtual leadership, knowledge sharing, and virtual team performance. In particular, the analysis shows that: Social presence and knowledge sharing: relationship building, cohesion, trust, and communication are examples of social presence behaviours that have a strong positive link with knowledge sharing. Increased social presence is positively correlated with the chance of sharing knowledge, highlighting the critical role that social interactions play in promoting knowledge exchange in virtual team environments. Virtual leadership and knowledge sharing: effective virtual leadership has a favourable impact on virtual team members' sharing of knowledge. Strong virtual leaders are essential in fostering an environment that allows information to flow and improves team performance. Knowledge sharing and virtual teams' performance: a virtual team's performance is positively impacted by members who share more knowledge with one another. Efficient strategies for exchanging knowledge are critical to maximising team productivity in remote settings.

Social presence and virtual teams' performance: heightened social presence among members of virtual teams contributes positively to overall team performance. Nurturing a sense of connection and involvement among virtual team members is crucial for enhancing team effectiveness in virtual settings. Virtual leadership and virtual teams performance: effective virtual leadership has a favourable effect on the performance of virtual teams. Regardless of organisational and geographic barriers, virtual leaders are crucial in directing and motivating their teams to reach high performance standards.

Mediating role of knowledge sharing: the performance of virtual teams and social presence are mediated by knowledge sharing. Social presence affects information sharing, which in turn has a direct and indirect impact on team performance. The mediating role of knowledge sharing in the relationship between virtual teams' performance and virtual leadership. The hypothesis is partially supported by the data, which shows that whereas virtual leadership directly affects the performance of virtual teams, knowledge sharing has no statistically significant indirect effect. These findings suggest that while information exchange has a minor mediating role in the success of virtual teams, virtual leadership has a direct impact on team performance. The findings imply that the association between social presence practices and virtual team performance is not substantially mediated by media richness. Furthermore, the findings imply that the relationship between virtual leadership and virtual team performance is not substantially mediated by media richness.

Limitations and Future Directions: the study acknowledges limitations such as cross-sectional design. Future research directions include longitudinal studies, mixed-methods approaches, and cross-cultural studies to further understand the dynamics of virtual teams, leadership, knowledge sharing, and team performance.

To sum up, the analytical chapter emphasises the value of knowledge sharing, social presence, and virtual leadership in improving the effectiveness of virtual teams. It emphasises how important it is for businesses to give these elements top priority and to have strategies in place that will help them work together and share information in virtual team situations.

REFERENCES

- Aarthi, G., & Sujatha, S. (2022). Future Team Leadership and Empowerment in the Performance of Measuring Virtual Team Productivity With Information Technology. *International Journal of Professional Business Review*, 7(2), 1–19. Available at: <https://doi.org/10.26668/businessreview/2022.v7i2.501>
- Abarca, V. M. G., Palos-Sanchez, P. R., & Rus-Arias, E. (2020). Working in Virtual Teams: A Systematic Literature Review and a Bibliometric Analysis. *IEEE Access*, 8, 168923–168940. Available at: <https://doi.org/10.1109/access.2020.3023546>
- Abd Shaheen, A. R., & Alzubaidy, L. M. I. (2022). Challenges Performance Facing Global Virtual Teams In Global Software Development: Literature Review. *2022 8th International Conference on Contemporary Information Technology and Mathematics, ICCITM 2022*, 73–78. Available at: <https://doi.org/10.1109/ICCITM56309.2022.10031965>
- Abdullah, M., Husin, N. A., & Haider, A. (2020). Development of Post-Pandemic COVID-19 Higher Education Resilience Framework in Malaysia. *Archives of Business Research*, 8(5), 201–210. Available at: <https://doi.org/10.14738/abr.85.8321>
- Adiloğlu, F., Fragiaco, F., & Petricone, F. (2021). Distance Artist: Building the Skills of Future Creatives. Developing Evidence-Based Criteria for Global Virtual Team Tutoring and Management in Art and Design Education. *International Journal of Art and Design Education*, 40(1), 268–282. Available at: <https://doi.org/10.1111/jade.12336>
- Afshari, L., Ahmad, M. S., & Mansoor, T. (2023). How to lead responsibly toward enhanced knowledge sharing behavior and performance: implications for human resource management. *Personnel Review*. Available at: <https://doi.org/10.1108/PR-12-2022-0869>
- Agbi, R. O. (2018). Leadership Communications Strategies for Enhancing Virtual Team Performance. *ProQuest Dissertations and Theses*, 116.
- Al Kaabi, H. M. A., Sidek, S., & Mosali, N. A. (2022). Mediation Model of Factors Affecting Virtual Team Performance in UAE Organisations. *International Journal of Sustainable Construction Engineering and Technology*, 13(2), 268–284. Available at: <https://doi.org/10.30880/ijscet.2022.13.02.024>
- Al Uwaisi, M., & Devi, R. (2022). Online Work from Home: Issues and Challenges. *International Journal of Academic Research in Business and Social Sciences*, 12(11), 425–436. Available at: <https://doi.org/10.6007/ijarbss/v12-i11/15574>
- Aleem, M. (2021). *Relationship Development Processes in Global Virtual Teams*. University of Turku.

- Al-hamande, A. R. A., & Ibrahim, laheeb. (2023). Proposing And Design a Model to Develop the Global Virtual Team (GVT) Performance in Global Software Development (GSD). *Journal of Education and Science*, 32(2), 61–70. Available at: <https://doi.org/10.33899/edusj.2023.137891.1320>
- Alkoud, S., & Qatamin, L. (2023a). Hybrid Work in International Business: Challenges and Opportunities in light of Dual Factor Theory. *International Journal of Academic Research in Business and Social Sciences*, 13(7), 1354–1371. Available at: <https://doi.org/10.6007/ijarbss/v13-i7/17314>
- Alkoud, S., & Qatamin, L. (2023b). The Benefits of Employing Global Virtual Teams in International Business. *International Journal of Academic Research in Business and Social Sciences*, 13(6), 2088–2101. Available at: <https://doi.org/10.6007/ijarbss/v13-i6/17169>
- Alkoud, S., Zainudin, D., & Mhd Sarif, S. (2023a). Challenges, Barriers, and Obstacles Facing Virtual Teams: a Conceptual Study. *International Journal of Academic Research in Business and Social Sciences*, 13(4), 1473–1487. Available at: <https://doi.org/10.6007/ijarbss/v13-i4/16723>
- Alkoud, S., Zainudin, D., & Mhd Sarif, S. (2023b). Exploring the Roles of Social Presence Practices in Enhancing Virtual Teams Performance in the Higher Education Sector in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 13(4), 1462–1472. Available at: <https://doi.org/10.6007/ijarbss/v13-i4/16722>
- Almadana, A. V., Suharnomo, S., & Perdhana, M. S. (2022). Can generational differences and feeling trusted improve knowledge-sharing behavior? Consequences of high-performance work systems. *Journal of Workplace Learning*, 34(2), 200–214. Available at: <https://doi.org/10.1108/JWL-05-2021-0058>
- Almahdi, M. H., Al Murshidi, G., & Al-Mahdi, O. (2023). Being socially present in a time of social distancing: investigating the online social learning experiences of teacher-trainees during COVID-19. *Higher Education, Skills and Work-Based Learning*, 13(4), 667–681. Available at: <https://doi.org/10.1108/HESWBL-03-2022-0066>
- AlMarar, R., Alkhodari, A., Atia, D. Y., Mohamed, S., & Shubair, R. M. (2021). Relationship Between Organizational Trust, Communication, and Team Performance Within Virtual Teams. *TIJAB (The International Journal of Applied Business)*, 5(1), 1.
- Amzat, I. H., Mohd Ali, H., Ibrahim, M. B., Othman, A., Bin Salleh, M. J., & Alade Najimdeen, A. H. (2023). Internationalization of Higher Education, University Quality Service, and International Students' Loyalty in Malaysia. *SAGE Open*, 13(4), 1–18. Available at: <https://doi.org/10.1177/21582440231210498>

- Angelo, R., & McCarthy, R. (2020). A Pedagogy to Develop Effective Virtual Teams. *Journal of Computer Information Systems*, 00(00), 1–8. Available at: <https://doi.org/10.1080/08874417.2020.1717396>.
- Anis, M. Z. A., Hadi, S., Rajiani, I., & Abbas, E. W. (2021). The managerial effects of leadership, knowledge sharing and innovation in higher education. *Polish Journal of Management Studies*, 23(1), 59–73. Available at: <https://doi.org/10.17512/pjms.2021.23.1.04>
- Arifin, Z., Said, M., & Said, L. R. (2022). Virtual Team Communication To Improve Task Performance in Environmental Management Process. *Procedia Environmental Science, Engineering and Management*, 9(2), 299–308.
- Aung, T. (2022). Effect of Team Communication and Team Coordination on Team Performance At Ministry of Agriculture, Livestock and Irrigation. Yangon University of Economics.
- Azlan, C. A., Wong, J. H. D., Tan, L. K., Muhammad Shahrin, M. S. N., Ung, N. M., Pallath, V., Tan, C. P. L., Yeong, C. H., & Ng, K. H. (2020). Teaching and learning of postgraduate medical physics using Internet-based e-learning during the COVID-19 pandemic – A case study from Malaysia. *Physica Medica*, 80, 10–16. Available at: <https://doi.org/10.1016/j.ejimp.2020.10.002>
- Bartsch, S., Weber, E., Büttgen, M., & Huber, A. (2020). Leadership matters in crisis-induced digital transformation: how to lead service employees effectively during the COVID-19 pandemic. *Journal of Service Management*, 32(1), 71–85. Available at: <https://doi.org/10.1108/JOSM-05-2020-0160>
- Bassey, M. (2012), “Case studies”, in Briggs, A., Coleman, M. and Morrison, M. (Eds), *Research Methods in Educational Leadership and Management*, 3rd ed., Sage, London, pp. 155-169
- Batarseh, F. S., Usher, J. M., & Daspit, J. J. (2017). Collaboration capability in virtual teams: Examining the influence on diversity and innovation. *International Journal of Innovation Management*, 21(4), 1–29. Available at: <https://doi.org/10.1142/S1363919617500347>
- Bechara, J., & Van de Ven, A. H. (2011). Triangulating philosophies of science to understand complex organizational and managerial problems. In *Research in the Sociology of Organizations* (Vol. 32). Available at: [https://doi.org/10.1108/S0733-558X\(2011\)0000032014](https://doi.org/10.1108/S0733-558X(2011)0000032014)
- Bekirogullari, Z., & Thambusamy, R. X. (2020). Virtual Leadership in Small Businesses during the COVID-19 Pandemic: Challenges and Possibilities. *The European Journal of Social & Behavioural Sciences*, 29(3), 3214–3224. Available at: <https://doi.org/10.15405/ejsbs.281>

- Ben Sedrine, S., Bouderbala, A., & Nasraoui, H. (2020). Leadership style effect on virtual team efficiency: trust, operational cohesion and media richness roles. *Journal of Management Development*, 40(5), 365–388. Available at: <https://doi.org/10.1108/JMD-10-2018-0289>
- Bennett, E. E., & Bierema, L. L. (2010). The ecology of virtual human resource development. *Advances in Developing Human Resources*, 12(6), 632–647. Available at: <https://doi.org/10.1177/1523422310394789>
- Bennett, E. E., & McWhorter, R. R. (2021). Virtual HRD's Role in Crisis and the Post Covid-19 Professional Lifeworld: Accelerating Skills for Digital Transformation. *Advances in Developing Human Resources*, 23(1), 5–25. Available at: <https://doi.org/10.1177/1523422320973288>
- Bhat, S. K., Pande, N., & Ahuja, V. (2017). Virtual Team Effectiveness: An Empirical Study Using SEM. *Procedia Computer Science*, 122, 33–41. Available at: <https://doi.org/10.1016/j.procs.2017.11.338>
- Bhattacharjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* (2nd editio). Creative Commons Attribution-NonCommercial. Available at: http://scholarcommons.usf.edu/oa_textbooks
- Bickle, J. T., Hirudayaraj, M., & Doyle, A. (2019). Social Presence Theory: Relevance for HRD/VHRD Research and Practice. *Advances in Developing Human Resources*, 21(3), 383–399. Available at: <https://doi.org/10.1177/1523422319851477>
- Birhanu, E. T., & Gugssa, M. A. (2024). Employee Cohesion and Its Influence on Workplace Learning: the Lived Experiences of Public University Lecturers in Ethiopia. *Journal of Workplace Learning*, 36(1), 113–128. Available at: <https://doi.org/10.1108/JWL-07-2023-0118>
- Breuer, C., Hüffmeier, J., Hibben, F., & Hertel, G. (2020). Trust in teams: A taxonomy of perceived trustworthiness factors and risk-taking behaviors in face-to-face and virtual teams. *Human Relations*, 73(1), 3–34. Available at: <https://doi.org/10.1177/0018726718818721>
- Brown, M., O'Hara, J., McNamara, G., Skerritt, C., & Shevlin, P. (2021). Global messages from the edge of Europe the cause and effect of leadership and planning strategies during the COVID-19 pandemic. *Irish Educational Studies*, 40(2), 151–159. Available at: <https://doi.org/10.1080/03323315.2021.1915837>
- Burke, M. E. (2007). Making choices: Research paradigms and information management: Practical applications of philosophy in IM research. *Library Review*, 56(6), 476–484. Available at: <https://doi.org/10.1108/00242530710760373>
- Butt, A. I., Aziz, F., & Batool, T. (2022). *E-Leadership Challenges & Opportunities For Pakistani Universities*. 19(2), 224. Available at: <http://www.webology.or>

- Byrne, B. M. (2010). Structural Equation Modeling with AMOS Basic Concepts, Applications, and Programming. In *Routledge* (2th editio). Available at: <https://doi.org/10.4324/9781315757421>
- Byrne, B. M. (2013). Structural Equation Modeling With AMOS. In *Structural Equation Modeling With AMOS*. Available at: <https://doi.org/10.4324/9781410600219>
- Byrne, B. M. (2016). Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming. In *Routledge* (3th editio).
- Caligiuri, P., De Cieri, H., Minbaeva, D., Verbeke, A., & Zimmermann, A. (2020). International HRM insights for navigating the COVID-19 pandemic: Implications for future research and practice. *Journal of International Business Studies*, 51(5), 697–713. Available at: <https://doi.org/10.1057/s41267-020-00335-9>
- Capolupo, N., Palumbo, R., & Adinolfi, P. (2022). All That Glitters Is Not Gold. Exploring Virtual Team Adoption in the Covid-19 Era. In *International Journal of Entrepreneurial Knowledge* (Vol. 10, Issue 1, pp. 46–64). Available at: <https://doi.org/10.37335/ijek.v10i1.148>
- Catyanadika, P. E., & Rajasekera, J. (2022). Influence of psychological safety and social presence on knowledge sharing behavior in higher education online learning environment. *VINE Journal of Information and Knowledge Management Systems*, 52(3), 335–353. Available at: <https://doi.org/10.1108/VJIKMS-06-2021-0094>
- Chan Ie Lyn, J., & Muthuveloo, R. (2019). Investigating technology and organizational performance of private higher learning institutions in Malaysia. *International Journal of Information and Learning Technology*, 36(5), 453–466. Available at: <https://doi.org/10.1108/IJILT-02-2019-0015>
- Chan, M. S., Fauzi, M. F., Juhari, S. N., Aliman, N., Rajoo, M., Abdul Wahab, N. M., & Magiman, M. M. (2022). Blended learning practices in Malaysia higher education: A review. *Mathematical Statistician and Engineering Applications*, 71(3), 1637–1652. Available at: <https://www.researchgate.net/publication/366984593>
- Chang, R. X., Carvalho, M. M., & Sbragia, R. (2023). Towards a comprehensive conceptual framework for multicultural virtual teams: a multilevel perspective exploring the relationship between multiculturalism and performance. In *International Journal of Managing Projects in Business* (Vol. 16, Issue 2, pp. 325–354). Emerald Publishing. Available at: <https://doi.org/10.1108/IJMPB-09-2021-0252>
- Chaudhary, M., Chopra, S., & Kaur, J. (2022). Cohesion as a cardinal antecedent in virtual team performance: a meta-analysis. *Team Performance Management*, 28(5–6), 398–414. Available at: <https://doi.org/10.1108/TPM-02-2022-0017>

- Chaudhary, P., Rohtagi, M., Singh, R. K., & Arora, S. (2022). Impact of leader's e-competencies on employees' wellbeing in global virtual teams during COVID-19: the moderating role of emotional intelligence. *Employee Relations*, 44(5), 1042–1057. Available at: <https://doi.org/10.1108/ER-06-2021-0236>
- Chen, C. C., Wu, J., & Hayashi, A. M. (2006). Importance of diversified leadership roles in improving team effectiveness in a virtual collaboration learning environment. *Association for Information Systems - 12th Americas Conference On Information Systems, AMCIS 2006*, 4(2008), 2223–2231. Available at: <https://www.jstor.org/stable/jeductechsoci.11.1.304>
- Cheng, X., Bao, Y., Yu, X., & Shen, Y. (2021). Trust and Group Efficiency in Multinational Virtual Team Collaboration: A Longitudinal Study. *Group Decision and Negotiation*, 0123456789. Available at: <https://doi.org/10.1007/s10726-020-09722-x>
- Choi, S. Y., Kang, Y. S., & Lee, H. (2008). The effects of socio-technical enablers on knowledge sharing: An exploratory examination. *Journal of Information Science*, 34(5), 742–754. Available at: <https://doi.org/10.1177/0165551507087710>
- Chung, H. F., Shin, J. W., Chiang, H. Y., & Ho, M. T. (2022). What Drives Working Habits for Sharing Knowledge in Virtual Teams? An Organizational Embeddedness Perspective. *SAGE Open*, 12(1). Available at: <https://doi.org/10.1177/21582440221079924>
- Clark, D. A. G., Marnewick, A. L., & Marnewick, C. (2019). Virtual Team Performance Factors: A Systematic Literature Review. *IEEE International Conference on Industrial Engineering and Engineering Management*, 40–44. Available at: <https://doi.org/10.1109/IEEM44572.2019.8978809>
- Claus, L. (2021). Do We Need a New Leadership Paradigm Due to Covid-19? *International Journal of Business and Management Research*, 9(2), 162–167. Available at: <https://doi.org/10.37391/ijbmr.090206>
- Cuaresma-Escobar, K. J. (2021). Nailing the situational leadership theory by synthesizing the culture and nature of principals' leadership and roles in school. *Linguistics and Culture Review*, 5(S3), 319–328. Available at: <https://doi.org/10.21744/lingcure.v5ns3.1530>
- Daft, R. L., & Lengel, R. H. (1986). Organizational Information Requirements, Media Richness and Structural Design. *Management Science*, 32(5), 554–571. Available at: <https://doi.org/10.1287/mnsc.32.5.554>
- Dahlstrom-Hakki, I., Alstad, Z., & Banerjee, M. (2020). Comparing Synchronous and Asynchronous Online Discussions for Students with Disabilities: The Impact of Social Presence. *National Science Foundation*. Available at: <https://doi.org/10.1016/j.compedu.2020.103842>

- Dash, S., & Saini, G. (2023). Are cohesive and mindful employees in India more likely to hoard knowledge? The mediating effect of meaning-making through work. *Journal of Knowledge Management*, 27(9), 2376–2392. Available at: <https://doi.org/10.1108/JKM-09-2022-0687>
- Daud, S., Hanafi, W. N. W., Toolib, S. N., & Rajadurai, J. (2020). Employee Well-being during COVID-19 in Higher Education Institution in Malaysia: A Case Study. *International Journal of Business Management*, 3(2), 1–10. Available at: <http://journal.uniten.edu.my/index.php/ijbm/article/view/231>
- Davidaviciene, V., Al Majzoub, K., & Meidute-Kavaliauskiene, I. (2020). sustainability Factors Affecting Knowledge Sharing in Virtual Teams. *Www.Mdpi.Com/Journal/Sustainability*, 12(6917), 1–15. Available at: <https://doi.org/10.3390/su12176917>
- Davidaviciene, V., Majzoub, K. Al, & Meidute-Kavaliauskiene, I. (2020). Factors Affecting Decision-Making Processes in Virtual Teams In The UAE. *Information Journal, MDPI*, 11(10), 1–13. Available at: <https://doi.org/10.3390/info11100490>
- Dawson, C. (2002). *A practical Guide to Research Methods: A user-friendly manual for mastering research techniques and projects* (3rd edition). How To Books. Available at: www.howtobooks.co.uk
- Demir, S. (2022). Comparison of Normality Tests in Terms of Sample Sizes under Different Skewness and Kurtosis Coefficients. *International Journal of Assessment Tools in Education*, 9(2), 397–409. Available at: <https://doi.org/10.21449/ijate.1101295>
- Dennis, A. R., & Kinney, S. T. (1998). Testing Media Richness Theory in the New Media: The Effects of Cues, Feedback, and Task Equivocality. *Information Systems Research*, 9(3), 256–274. Available at: <https://doi.org/10.1287/isre.9.3.256>
- Dumanig, F. P., & Symaco, L. P. (2020). Internationalisation of higher education in Malaysia and the Philippines: a comparative analysis of mission and vision statements of selected universities. *Journal of Multilingual and Multicultural Development*, 43(2), 154–166. Available at: <https://doi.org/10.1080/01434632.2020.1735401>
- Dutta, T., & Mandal, M. K. (2018). Neuromarketing in India: Understanding the Indian consumer. In *Neuromarketing in India: Understanding the Indian Consumer*. Available at: <https://doi.org/10.4324/9781351269360>
- Ebrahim, N. A. (2015). Virtual R&D Teams: A New Model for Product Development. *International Journal of Innovation*, 3(2), 1–27. Available at: <http://www.redalyc.org/articulo.oa?id=499150612001%0AHow>

- Efimov, I., Harth, V., & Mache, S. (2020). Health-oriented self- and employee leadership in virtual teams: A qualitative study with virtual leaders. *International Journal of Environmental Research and Public Health*, 17(18), 1–19. Available at: <https://doi.org/10.3390/ijerph17186519>
- El Idrissi, A., & Fourka, M. (2022). Performance in Virtual Teams: Towards an Integrative Model. *MDPI*, 73. Available at: <https://doi.org/10.3390/proceedings2022082073>
- Elyousfi, F., Anand, A., & Dalmasso, A. (2021b). Impact of e-leadership and team dynamics on virtual team performance in a public organization. *International Journal of Public Sector Management*, 34(5), 508–528. Available at: <https://doi.org/10.1108/IJPSM-08-2020-0218>
- Eseryel, U. Y., Crowston, K., & Heckman, R. (2021). Functional and Visionary Leadership in Self-Managing Virtual Teams. *Group and Organization Management*, 46(2), 424–460. Available at: <https://doi.org/10.1177/1059601120955034>
- Fahlevi, M., Jermisittiparsert, K., Wongsuwan, N., Aljuaid, M., Chankoson, T., & Waiyawuththanapoom, P. (2022). The Leadership, Trust, and Openness to Experience as Antecedents of Performance of Sports Manufacturing Firms of Thailand, Exploring the Mediating Role of Team Cohesion. *Revista de Psicologia Del Deporte*, 31(3), 177–185.
- Fahrmeir, L., Kneib, T., Lang, S., & Marx, B. (2013). *Regression Models, Methods and Applications*.
- Fang, W., Wan, L., & Zhou, L. (2024). The impact of cooperative communication on co-innovation performance: the mediating role of knowledge sharing. *Chinese Management Studies*. Available at: <https://doi.org/10.1108/CMS-08-2022-0284>
- Fekry Youssef, M., Fathy Eid, A., & Mohamed Khodeir, L. (2023). Challenges affecting efficient management of virtual teams in construction in times of the COVID-19 pandemic. *Ain Shams Engineering Journal*, 14(7), 102008. Available at: <https://doi.org/10.1016/j.asej.2022.102008>
- Ferreira, P., Meirinhos, V., Rodrigues, A. C., & Marques, A. (2021). Virtual and augmented reality in human resource management and development: A systematic literature review. *IBIMA Business Review*, 2021. Available at: <https://doi.org/10.5171/2021.926642>
- Fink, A. (2003) *The Survey Kit*, 2nd ed. Thousand Oaks, CA: Sage.
- Flak, O., & Pyszka, A. (2022). Evolution From Human Virtual Teams to Artificial Virtual Teams Supported by Artificial Intelligence. Results of Literature Analysis and Empirical Research. *Problemy Zarządzania - Management Issues*, 2022(2(96)), 48–69. Available at: <https://doi.org/10.7172/1644-9584.96.3>

- Francisco, C., & Nuqui, A. V. (2020). Emergence of a Situational Leadership during COVID-19 Pandemic called New Normal Leadership. *International Journal of Academic Multidisciplinary Research*, 4(10), 15–19.
- Fuller, R., & Summers, J. (2017). The Impact of Virtual Team Consistency on Individual Performance and Perceptual Outcomes Over Time. *Proceedings of the 50th Hawaii International Conference on System Sciences (2017)*, 791–800. Available at: <https://doi.org/10.24251/hicss.2017.095>
- Gallego, J. S., Ortiz-Marcos, I., & Romero Ruiz, J. (2021). Main challenges during project planning when working with virtual teams. *Technological Forecasting and Social Change*, 162(June 2020), 120353. Available at: <https://doi.org/10.1016/j.techfore.2020.120353>
- Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021). Virtual Teams in Times of Pandemic: Factors That Influence Performance. *Frontiers in Psychology*, 12(February), 1–14. Available at: <https://doi.org/10.3389/fpsyg.2021.624637>
- Ghanbari, J. A. S. (2022). Investigate the role of servant leadership and team leadership In team performance mediated by team cohesion and team learning In the teams of secondary school teachers in Kurdistan province. *Journal of School Administrarion*, 9(4), 18–39.
- Gibson, C. B., & Grushina, S. V. (2021). A Tale of Two Teams: Next Generation Strategies for Increasing the Effectiveness of Global Virtual Teams. *Organizational Dynamics*, 50(1), 100823. Available at: <https://doi.org/10.1016/j.orgdyn.2020.100823>
- Gilbert, D. M. (2022). *Leadership strategies used for virtual team success* (Doctoral dissertation, Walden University).
- Glikson, E., & Erez, M. (2020). The emergence of a communication climate in global virtual teams. *Journal of World Business*, 55(6), 101001. Available at: <https://doi.org/10.1016/j.jwb.2019.101001>
- Gohar, M., Mehmood, A., Nazir, S., Abrar, A., & Iqbal, Y. M. J. (2023). Situationally Appropriate Leadership Styles and Team Performance: Is Trust Really Important Madiha Gohar , Ayesha Mehmood , Sana Nazir , Ayesha Abrar and Yasmine Muhammad Javaid Iqbal. *FWU Journal of Social Sciences*, 17(3), 136–151. Available at: <http://doi.org/10.51709/19951272/Fall 2023/10>
- González-Anta, B., Orengo, V., Zornoza, A., Peñarroja, V., & Gamero, N. (2021). Sustainable virtual teams: Promoting well-being through affect management training and openness to experience configurations. *Sustainability (Switzerland)*, 13(6). Available at: <https://doi.org/10.3390/su13063491>
- Gordon, A. (2017). Leadership interaction in global virtual teams: roles models and challenges. *PhD Diss. Auckland University of Technology*.

- Green, S. B., & Salkind, N. J. (2014). *Using SPSS for Windows and Macintosh Analyzing And Understanding Data* (7th editio). Pearson Education, Inc.
- Guerra-Brown, N. (2017). E-leadership and Leader-Member Exchange Strategies for Increasing Nonprofit Virtual Team Productivity. *ProQuest Dissertations and Theses*, 167. Available at: <https://scholarworks.waldenu.edu/dissertations/4447>
- Gupta, S., Mathur, N., & Narang, D. (2022). E-leadership and virtual communication adoption by educators: an UTAUT3 model perspective. *Global Knowledge, Memory and Communication*. Available at: <https://doi.org/10.1108/GKMC-01-2022-0001>
- Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate Data Analysis (MVDA). In *Pearson Education Limited*. Available at: <https://doi.org/10.1002/9781118895238.ch8>
- Hair, J., Black, W., Babin, B., & Anderson, R. (2010). Multivariate Data Analysis. In *Pearson Prentice Hall* (7 Edition). Pearson Prentice Hall. Available at: <https://doi.org/10.3390/polym12123016>
- Halid, H., Kee, D. M. H., & Rahim, N. F. A. (2024). Perceived Human Resource Management Practices and Intention to Stay in Private Higher Education Institutions in Malaysia: The Role of Organizational Citizenship Behaviour. *Global Business Review*, 25(1), 162–179. Available at: <https://doi.org/10.1177/0972150920950906>
- Halim, A. N., Zawawi, A. A., Zawawi, A. A., & Kamarunzaman, Z. (2021). The Role of Team Communication, Team Leadership, and Team Time Management on SAR Team Performance in Malaysia. *Journal of Administrative Science*, 18(2), 90–110. Available at: https://jas.uitm.edu.my/images/2021_DEC/JAS5.pdf
- Han, S. J., Kim, M., Beyerlein, M., & DeRosa, D. (2020). Leadership Role Effectiveness as a Mediator of Team Performance in New Product Development Virtual Teams. *Journal of Leadership Studies*, 13(4), 20–36. Available at: <https://doi.org/10.1002/jls.21677>
- Henry, M. S., le Roux, D. B., & Parry, D. A. (2021). Working in a post Covid-19 world: Towards a conceptual framework for distributed work. *South African Journal of Business Management*, 52(1), 1–11. Available at: <https://doi.org/10.4102/SAJBM.V52I1.2155>
- Hersey, P., & Blanchard, K. H. (2012). The Hersey-Blanchard Situational Leadership Theory-Choosing the Right Leadership Style for the Right People. *Mindtools.Com*, 562.
- Hoch, J. E., & Dulebohn, J. H. (2017). Team personality composition, emergent leadership and shared leadership in virtual teams: A theoretical framework. *Human Resource Management Review*, 27(4), 678–693. Available at: <https://doi.org/10.1016/j.hrmr.2016.12.012>

- Holle, N. (2021). *Perceived Group Cohesion And Its Relation With Individual And Team Performance In Sports* (Vol. 7, Issue 3). Angelo State University. Available at: <https://hdl.handle.net/2346.1/37950>
- Hollebeek, L. D., C., & M. K. and Macky, K. (2021). Demystifying consumer digital cocreated value: social presence theory-informed framework and propositions. *Recherche et Applications En Marketing*, 36(4), 24–42. Available at: <https://doi.org/10.1177/2051570720961986>
- Hyvönen, M., & Uotila, E. (2021). *Leadership And Communication In Virtual Teams*. University of Applied Science. Available at: <https://urn.fi/URN:NBN:fi:amk-2021053112718>
- Ibrahim, S. N. L., Rezali, N., & Yunan, Y. S. M. (2021). The challenges of work from home that affect higher education productivity during COVID-19 outbreak. *AIP Conference Proceedings*, 2347(July). Available at: <https://doi.org/10.1063/5.0051834>
- Ioannidis, A., & Makridakis, C. (2020). *Managerial competencies and skills in virtual teams of matrix organizations: A correlation analysis on virtual team performance*. June, 1–59. Available at: www.bth.se/mba
- Ishak, M. A. H., Thani, A. K. A., Min, N. M. F. N., & Sakarji, S. R. (2022). Effect of Good Corporate Governance and Leverage on Profitability-Mediated Tax Avoidance (Study on Mining Companies listed on the Indonesia Stock Exchange 2016 – 2019). *International Journal of Academic Research in Accounting Finance and Management Sciences*, 11(2), 104–115. Available at: <https://doi.org/10.6007/IJARAFMS>
- Jafari, S. (2021). *Team Cultural Intelligence in Virtual Student Teams at Radboud University Nijmegen* [Radboud University Nijmegen]. Available at: <https://theses.uibn.ru.nl/handle/123456789/11661>
- Jahagirdar, R., & Bankar, S. (2021). Performance in Virtual Teams–A Conceptual Overview. *Bilingual Research Journal*, 7(28), 262–267.
- Jahanbin, P., & Wingreen, S. (2018). The effect of the social media tools on virtual team performance: The mediating role of transactive memory system mapping with the feature richness. *Proceedings of the 22nd Pacific Asia Conference on Information Systems - Opportunities and Challenges for the Digitized Society: Are We Ready?*, PACIS 2018. Available at: <https://aisel.aisnet.org/pacis2018>
- Jang, M. H., & Choi, E. Y. (2022). How Will Video Conference Fatigue Affect Participants of MICE in the With-COVID-19 Era? Focusing on Video Conference Quality, Social Presence Theory, and Flow. *International Journal of Environmental Research and Public Health*, 19(8). Available at: <https://doi.org/10.3390/ijerph19084601>
- Johnston, A. (2014). Rigour in research: Theory in the research approach. *European Business Review*, 26(3), 206–217. Available at: <https://doi.org/10.1108/EBR-09-2013-0115>

- Jones, C. M. (2023). *UWM Digital Commons Comparing Approaches to Virtual Team Onboarding : the Influence of Synchrony and Cues on Impressions of Leaders During Encounter Phase Organizational Socialization* (Issue 3169). University of Wisconsin Milwaukee.
- Joshi, S. S., Davis, K. A., Shermadou, A., & Garcia, B. S. (2022). Exploring How Engineering Students Respond to Challenges While Working in Global Virtual Teams. *Proceedings - Frontiers in Education Conference, FIE, 2022-Octob.* Available at: <https://doi.org/10.1109/FIE56618.2022.9962438>
- Kamaruddin, M. I. H., Ahmad, A., Husain, M. A., & Abd Hamid, S. N. (2021). Graduate employability post-COVID-19: the case of a Malaysian public university. *Higher Education, Skills and Work-Based Learning*, 11(3), 710-724. Available at: <https://doi.org/10.1108/HESWBL-05-2020-0114>
- Kannan, K. S. P. N., & Garad, A. (2020). Competencies of quality professionals in the era of industry 4.0: a case study of electronics manufacturer from Malaysia. *International Journal of Quality and Reliability Management*. Available at: <https://doi.org/10.1108/IJQRM-04-2019-0124>
- Kanse, L., Stephenson, E. K., Klonek, F. E., & Wee, S. (2023). Interdependence in Virtual Teams—A Double-Edged Sword? *Small Group Research, Special Issue*, 1–34. Available at: <https://doi.org/10.1177/10464964231206129>
- Kashive, N., Khanna, V. T., & Powale, L. (2022). Virtual team performance: E-leadership roles in the era of COVID-19. *Journal of Management Development*, 41(5), 277–300. Available at: <https://doi.org/10.1108/JMD-05-2021-0151>
- Khatoon, A., Rehman, S. U., Islam, T., & Ashraf, Y. (2022). Knowledge sharing through empowering leadership: the roles of psychological empowerment and learning goal orientation. *Global Knowledge, Memory and Communication*. Available at: <https://doi.org/10.1108/GKMC-08-2022-0194>
- Kim, S. J., Jang, Y., Yoo, M., & Song, J. H. (2021). The mutual impact of university president's leadership and organizational justice on knowledge sharing: the mediating effect of communication. *Industrial and Commercial Training*, 53(3), 268–282. Available at: <https://doi.org/10.1108/ICT-08-2020-0094>
- Kline, R. B. (2016). Principles and Practice of Structural Equation Modeling. In *The Guilford Press* (4th editio, Vol. 1, Issue 1). Available at: <https://doi.org/10.15353/cgjsc.v1i1.3787>
- Kmiecik, R. (2020). Trust, knowledge sharing, and innovative work behavior: empirical evidence from Poland. *European Journal of Innovation Management*. Available at: <https://doi.org/10.1108/EJIM-04-2020-0134>

- Koo, Y., Kim, S. J., & Song, J. H. (2022). The moderating effect of communication on congruence and incongruence of openness to change: is communication always beneficial for learning organization culture and knowledge sharing? *Learning Organization*, 29(2), 172–190. Available at: <https://doi.org/10.1108/TLO-02-2021-0025>
- Kothari. (2004). *Research Methodology, Methods and Techniques* (2th Editio). New Age International (P) Ltd., Publishers. Available at: www.newagepublishers.com
- Krishnaswamy, J., Hossain, Z., Kavigha, M. K., & Nagaletchimee, A. (2019). What matters for higher education success of private educational institutions? Senior students' perceptions in Malaysia. *Journal of Applied Research in Higher Education*, 11(3), 616–635. Available at: <https://doi.org/10.1108/JARHE-07-2018-0142>
- Kwaye, A. S. (2018). Effective Strategies for Building Trust in Virtual Teams [Walden University]. In *ProQuest Dissertations and Theses*. Available at: <https://scholarworks.waldenu.edu/dissertations>
- Lamovšek, A., & Černe, M. (2023). Past, present and future: A systematic multitechnique bibliometric review of the field of distributed work. *Information and Organization*, 33(2). Available at: <https://doi.org/10.1016/j.infoandorg.2022.100446>
- Lee, Y. L. A., Malik, A., Rosenberger, P. J., & Sharma, P. (2020). Demystifying the differences in the impact of training and incentives on employee performance: mediating roles of trust and knowledge sharing. *Journal of Knowledge Management*, 24(8), 1987–2006. Available at: <https://doi.org/10.1108/JKM-04-2020-0309>
- Lee, Y., Tao, W., Li, J. Y. Q., & Sun, R. (2020). Enhancing employees' knowledge sharing through diversity-oriented leadership and strategic internal communication during the COVID-19 outbreak. *Journal of Knowledge Management*, 25(6), 1526–1549. Available at: <https://doi.org/10.1108/JKM-06-2020-0483>
- Liao, C. (2017). Leadership in virtual teams: A multilevel perspective. *Human Resource Management Review*, 27(4), 648–659. Available at: <https://doi.org/10.1016/j.hrmr.2016.12.010>
- Liao, G. Y., Huang, T. L., Cheng, T. C. E., & Teng, C. I. (2020). Impacts of media richness on network features and community commitment in online games. *Industrial Management and Data Systems*, 120(7), 1361–1381. Available at: <https://doi.org/10.1108/IMDS-01-2020-0001>
- Lin, C. N., & Roan, J. (2022). Identifying the development stages of virtual teams – An application of social network analysis. *Information Technology and People*, 35(7), 2368–2392. Available at: <https://doi.org/10.1108/ITP-04-2020-0251>

- Lin, C. P., Chiu, C. K., & Liu, N. T. (2019). Developing virtual team performance: an integrated perspective of social exchange and social cognitive theories. *Review of Managerial Science*, 13(4), 671–688. Available at: <https://doi.org/10.1007/s11846-017-0261-0>
- Lin, C., Standing, C., & Liu, Y. C. (2008). A model to develop effective virtual teams. *Decision Support Systems*, 45(4), 1031–1045. Available at: <https://doi.org/10.1016/j.dss.2008.04.002>
- Lippert, H., & Dulewicz, V. (2018). A profile of high-performing global virtual teams. *Team Performance Management*, 24(3–4), 169–185. Available at: <https://doi.org/10.1108/TPM-09-2016-0040>
- Lister, K. (2020), Latest Work-At-Home/Telecommuting/Mobile Work/Remote Work Statistics, Global Workplace Analytics
- Loode, A. (2021). *Virtual Meetings: Examining Presence on Group Communication Quality, Performance and Satisfaction in Communication Environments* [University of Twente]. Available at: <https://www.researchgate.net/publication/350471008>
- MacLean, M. (2013). Cracks in the (Self-Constructed?) ghetto walls? comments on paul ward's last man picked. In *International Journal of the History of Sport* (Vol. 30, Issue 1). Available at: <https://doi.org/10.1080/09523367.2012.743996>
- Mahtta, M., Pillai, R., Gunasekaran, A., Sivathanu, B., & Kaushik, N. (2022). A pathway to virtual team performance in the New Normal paradigm. *Journal of Organizational Effectiveness*, 9(4), 549–571. Available at: <https://doi.org/10.1108/JOEPP-11-2020-0218>
- Manyuchi, M. M., & Sukdeo, N. (2021). Application of the situational leadership model to achieve effective performance in mining organizations teams. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, 412–416.
- Maré, S., & Mutezo, A. T. (2024). The influence of self- and co-regulation on the community of inquiry for collaborative online learning: an ODeL context. *Journal of Applied Research in Higher Education*. Available at: <https://doi.org/10.1108/JARHE-08-2023-0325>
- Maria D. Garcia-Villarreal. (2023). Evaluating Healthcare Student Learning Performance During The Initial Year Of The Covid-19 Pandemic: A Case Study. University of Texas at Tyler. Available at: <https://hdl.handle.net/10950/4474>
- Marlow, S. L., Lacerenza, C. N., & Salas, E. (2017). Communication in virtual teams: a conceptual framework and research agenda. *Human Resource Management Review*, 27(4), 575–589. Available at: <https://doi.org/10.1016/j.hrmr.2016.12.005>

- Marques-Quinteiro, P., Uitdewilligen, S., Costa, P., & Passos, A. M. (2022). Learning through time: the role of team reflexivity and virtuality in decision-making teams. *Learning Organization*, 29(1), 69–82. Available at: <https://doi.org/10.1108/TLO-09-2020-0157>
- Martela, F. (2020). Self-determination theory. *The Wiley Encyclopedia of Personality and Individual Differences, Models and Theories*, 369–373. Available at: <https://doi.org/10.1002/9781119547143.ch61>
- Masood, A., Zhang, Q., Ali, M., Cappiello, G., & Dhir, A. (2023). Linking enterprise social media use, trust and knowledge sharing: paradoxical roles of communication transparency and personal blogging. *Journal of Knowledge Management*, 27(4), 1056–1085. Available at: <https://doi.org/10.1108/JKM-11-2021-0880>
- Matli, W. (2020). The changing work landscape as a result of the Covid-19 pandemic: insights from remote workers life situations in South Africa. *International Journal of Sociology and Social Policy*. Available at: <https://doi.org/10.1108/IJSSP-08-2020-0386>
- Mayer, C., Mutze-Niewohner, S., & Nitsch, V. (2020). Empirical classification of advanced information technology towards their support of leadership behaviors in virtual project management settings. *IEEE International Conference on Industrial Engineering and Engineering Management*, 2020-Decem, 275–279. Available at: <https://doi.org/10.1109/IEEM45057.2020.9309948>
- Mayer, C., Sivatheerthan, T., Mütze-niewöhner, S., & Nitsch, V. (2023). Sharing leadership behaviors in virtual teams : e f f e c t s of shared leadership behaviors on team member satisfaction and productivity. *Team Performance Management: An International Journal*, 29(1/2), 90–112. Available at: <https://doi.org/10.1108/TPM-07-2022-0054>
- McKenna, S., & Richardson, J. (2016). Self-initiated expatriation: changing the ontological and methodological box. *Qualitative Research in Organizations and Management: An International Journal*, 11(3), 150–168. Available at: <https://doi.org/10.1108/QROM-09-2015-1326>
- Miaohui, W., Yan, L., Fang-Yi, Y., & Zi-Qing, T. (2022). An empirical study of the relationship among communication, trust and performance of undergraduate course learning team: Based on structural equation model. *Cogent Education*, 9(1). Available at: <https://doi.org/10.1080/2331186X.2022.2154047>
- Mohammed, H., Al Kaabi, A., Sidek, S., & Mosali, N. A. (2022). International Journal of Sustainable Construction Engineering and Technology Factors Affecting Virtual Team Performance in UAE Organisations. *International Journal of Sustainable Construction Engineering and Technology*, 13(2), 300–314. Available at: <http://penerbit.uthm.edu.my/ojs/index.php/ijscet>

- Morrison-Smith, S., & Ruiz, J. (2020b). Challenges and barriers in virtual teams: a literature review. In *SN Applied Sciences* (Vol. 2, Issue 6). Springer International Publishing. Available at: <https://doi.org/10.1007/s42452-020-2801-5>
- Mukherjee, D., & Arora, N. (2020). Team cohesion and performance - A conceptual study in oil exploration teams in India. *European Journal of Molecular and Clinical Medicine*, 7(6), 2619–2629.
- Mutha, P., & Srivastava, M. (2021). Decoding leadership to leverage employee engagement in virtual teams. *International Journal of Organizational Analysis*. Available at: <https://doi.org/10.1108/IJOA-07-2021-2856>
- Mutha, P., & Srivastava, M. (2023). Decoding leadership to leverage employee engagement in virtual teams. *International Journal of Organizational Analysis*, 31(3), 737-758. Available at: <https://doi.org/10.1108/IJOA-07-2021-2856>
- Mysirlaki, S., & Paraskeva, F. (2020). Emotional intelligence and transformational leadership in virtual teams: lessons from MMOGs. *Leadership and Organization Development Journal*, 41(4), 551–566. Available at: <https://doi.org/10.1108/LODJ-01-2019-0035>
- Nabi, B., Khan, A., Ismail, Z., Hidayahalwi, N., & Osman, Z. (2020). Indirect Relationship among Peer Support, Motivation and Work from Home Productivity of Higher Education Institutions during COVID-19 Pandemic in Malaysia. *ASEAN Journal of Open and Distance Learning. Special Issue, April, 2020*.
- Natu, S., & Aparicio, M. (2022). Analyzing knowledge sharing behaviors in virtual teams: Practical evidence from digitalized workplaces. *Journal of Innovation and Knowledge*, 7(4), 100248. Available at: <https://doi.org/10.1016/j.jik.2022.100248>
- Newman, S. A., & Ford, R. C. (2021). Five Steps to Leading Your Team in the Virtual COVID-19 Workplace. *Organizational Dynamics*, 50(1), 100802. Available at: <https://doi.org/10.1016/j.orgdyn.2020.100802>
- Newman, S. A., Ford, R. C., & Marshall, G. W. (2020). Virtual Team Leader Communication: Employee Perception and Organizational Reality. *International Journal of Business Communication*, 57(4), 452–473. Available at: <https://doi.org/10.1177/2329488419829895>
- Nguyen, M., Rundle-Thiele, S., Malik, A., & Budhwar, P. (2023). Impact of technology-based knowledge sharing on employee outcomes: moderation effects of training, support and leadership. *Journal of Knowledge Management*, 27(8), 2283–2301. Available at: <https://doi.org/10.1108/JKM-07-2022-0552>

- Nguyen, T. M., & Malik, A. (2020). Cognitive processes, rewards and online knowledge sharing behaviour: the moderating effect of organisational innovation. *Journal of Knowledge Management*, 24(6), 1241–1261. Available at: <https://doi.org/10.1108/JKM-12-2019-0742>
- Nunnally, J.C. (1978). An Overview of Psychological Measurement. In: Wolman, B.B. (eds) *Clinical Diagnosis of Mental Disorders*. Springer, Boston, MA. Available at: https://doi.org/10.1007/978-1-4684-2490-4_4
- NurulJannah Ab Wahab, Abdullah, N. H., Rodzalan, S. A., & Rahman, Z. (2023). The Linkage Between Virtual Team Leadership Towards Team Performance: A Study at Selected Companies. *Journal of Techno-Social*, 15(1), 34–46. Available at: <https://doi.org/10.30880/jts.2023.15.01.003>
- Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A systematic review of social presence: Definition, antecedents, and implications. *Frontiers Robotics AI*, 5(OCT), 1–35. Available at: <https://doi.org/10.3389/frobt.2018.00114>
- Osman, Z., Ismail, Z., Ahmad Khan, B. N., & Alwi, N. H. (2020). Determinants of Work-from-Home Productivity among Higher Education Institution Employees during the Covid-19 Pandemic in Malaysia. *ASEAN Journal of Open and Distance Learning, Special Issue*, 1–13.
- Othman, S., Awis, M. L., Abdul Samad, S., & Harun, A. F. (2021). Consolidating Work From Home As The New Norms: Internal vs External Factors Among UiTM Staff. *Advances in Business Research International Journal*, 7(1), 65. Available at: <https://doi.org/10.24191/abrij.v7i1.13504>
- Pallant, J. (2010). *SPSS Survival Manual, A Step By Step Guide To Data Analysis Using SPSS* (4th editio). Open University Press.
- Pangil, F., & Chan, J. M. (2014). The mediating effect of knowledge sharing on the relationship between trust and virtual team effectiveness. *Journal of Knowledge Management*, 18(1), 92–106. Available at: <https://doi.org/10.1108/JKM-09-2013-0341>
- Paul, R., Drake, J. R., & Liang, H. (2016). Global Virtual Team Performance: The Effect of Coordination Effectiveness, Trust, and Team Cohesion. *IEEE Transactions on Professional Communication*, 59(3), 186–202. Available at: <https://doi.org/10.1109/TPC.2016.2583319>
- Pham, H. M., Le, T. T. H., Dang, L. H., & Nguyen, L. T. (2023). The impact of reward system on talented employees' performance in Vietnamese commercial banks: mediating role of job satisfaction. *Journal of Financial Services Marketing, March*. Available at: <https://doi.org/10.1057/s41264-023-00261-5>
- Phutrakhul, P. (2022). A Study on The Situation and Direction of Human Resource Development in The Thai Government System. *Social Science Journal*, 12(3), 1457–1471.

- Phutrakhul, P., & Sonsri, G. (2022). Synthesis of Thai Public Human Resource Development in the Future. *Journal of Positive School Psychology*, 6(2), 2337–2350. Available at: <http://journalppw.com>
- Pokhrel, S., & Chhetri, R. (2021). A Literature Review on Impact of COVID-19 Pandemic on Teaching and Learning. *Higher Education for the Future*, 8(1), 133–141. Available at: <https://doi.org/10.1177/2347631120983481>
- Presbitero, A. (2020). Foreign language skill, anxiety, cultural intelligence and individual task performance in global virtual teams: A cognitive perspective. *Journal of International Management*, 26(2), 100729. Available at: <https://doi.org/10.1016/j.intman.2019.100729>
- Presbitero, A. (2020c). Task performance in global virtual team: Examining the roles of perceived cultural dissimilarity and cultural intelligence of member and leader. *Personnel Review*, 49(5), 1091–1105. Available at: <https://doi.org/10.1108/PR-10-2018-0415>
- Presbitero, A., & Toledano, L. S. (2018). Global team members' performance and the roles of cross-cultural training, cultural intelligence, and contact intensity: the case of global teams in IT offshoring sector. *International Journal of Human Resource Management*, 29(14), 2188–2208. Available at: <https://doi.org/10.1080/09585192.2017.1322118>
- Rahman, M. M., & Singh, M. K. M. (2022). The Ideology Towards English as a Medium of Instruction (EMI) Adoption in Higher Education in Malaysia: A Case Study. *3L: Language, Linguistics, Literature*, 28(2), 109–121. Available at: <https://doi.org/10.17576/3L-2022-2802-08>
- Randazzo-Davis, M., & Nelson, C. (2020). International Business Education Using Global Virtual Teams: Relationship Between Cultural Intelligence, Global Knowledge, And Team Performance. *International Journal for Business Education*, 160(1), 42–61. Available at: <https://doi.org/10.30707/IJBE160.1.1648090946.651113>
- Robert, L. P., & You, S. (2018). Are you satisfied yet? Shared leadership, individual trust, autonomy, and satisfaction in virtual teams. *Journal of the Association for Information Science and Technology*, 69(4), 503–513. Available at: <https://doi.org/10.1002/asi.23983>
- Rogers, B. L., Madden, L. T., Grubb, L. K., & Karriker, J. H. (2021). Shouting across the digital divide: the import of social interactions in virtual teams. *Team Performance Management*, 27(1–2), 1–14. Available at: <https://doi.org/10.1108/TPM-05-2020-0042>
- Roscoe, A. M., Lang, D., & Sheth, J. N. (1975). Follow-up Methods, Questionnaire Length, and Market Differences in Mail Surveys: In this experimental test, a telephone reminder produced the best response rate and questionnaire length had no effect on rate of return. *Journal of Marketing*, 39(2), 20–27. Available at: <https://doi.org/10.1177/00222429750390020>

- Rossignoli, F., Lionzo, A., Henschel, T., & Boers, B. (2023). Knowledge sharing in family SMEs: the role of communities of practice. *Journal of Family Business Management*. Available at: <https://doi.org/10.1108/JFBM-03-2023-0038>
- Sabetzadeh, F., & Chen, Y. (2023). An investigation of the impact of interpersonal and institutional trust on knowledge sharing in companies: invisible hands for knowledge sharing. *VINE Journal of Information and Knowledge Management Systems*. Available at: <https://doi.org/10.1108/VJIKMS-06-2022-0206>
- Sagar, S. K., Arif, M., Oladinrin, O. T., & Rana, M. Q. (2021). Exploring Factors Affecting Trust in Construction Virtual Project Teams. *J Archit Eng Tech*, 10(11), 254. Available at: <http://hdl.handle.net/2436/624518>
- Sagar, S. K., Arif, M., Oladinrin, O. T., & Rana, M. Q. (2022). Challenges Negating Virtual Construction Project Team Performance In The Middle East. *Built Environment Project and Asset Management*, 12(4), 613–629. Available at: <https://doi.org/10.1108/BEPAM-08-2021-0104>
- Sagar, S. K., Oladinrin, O. T., Arif, M., & Rana, M. Q. (2022). Interpretive structural model of trust factors in construction virtual project teams. *Construction Innovation*. Available at: <https://doi.org/10.1108/CI-09-2021-0179>
- Sagar, S. K., Oladinrin, O. T., Arif, M., Kaushik, A., & Islam, R. (2023). Impact of trust in virtual project teams: structural equation modelling approach. *Construction Innovation*, 2003. Available at: <https://doi.org/10.1108/CI-03-2023-0039>
- Sakarji, S., Nik Min, N., Thani, A. K., & Ishak, M. A. (2023). *Working From Home on Job Performance During COVID-19: A Pilot Study of Malaysia Public Higher Education Institutions' Academics*. Available at: <https://doi.org/10.4108/eai.4-11-2022.2327864>
- Sandrasegaran, K., & Rambeli, N. (2024). Globalization and Higher Education in Malaysia. *International Business Education Journal*, 17(2), 222–240. Available at: <https://doi.org/10.4337/9780857936233.00023>
- Satya, R. I., & Shauki, E. R. (2022). Remote Audit Post Covid-19 Pandemic in Achieving Professional Skepticism Auditor: Implementation of Social Presence Theory (Case Study on the Financial and Development Supervisory Agency). *Proceedings of the 7th Sriwijaya Economics, Accounting, and Business Conference (SEABC 2021)*, 647(Seabc 2021), 346–354. Available at: <https://doi.org/10.2991/aebmr.k.220304.045>
- Saunders, M., Lewis, P., & Thornhill, A. (2009). Research methods for business students. In *International Journal of the History of Sport* (5th editio, Vol. 30, Issue 1). Pearson Education Limited. Available at: <https://doi.org/10.1080/09523367.2012.743996>
- Saunders, M., Lewis, P., & Thornhill, A. (2019). Research Methods for Business Students by Mark Saunders, Philip Lewis and Adrian Thornhill 8th edition. In *Research Methods For Business Students*.

- Schenkel, M. T., & Garrison, G. (2009). Exploring the roles of social capital and team-efficacy in virtual entrepreneurial team performance. *Management Research News*, 32(6), 525–538. Available at: <https://doi.org/10.1108/01409170910962966>
- Schumacker, R. E., & Lomax, R. G. (2010). *A beginner ' s Guide to Structural Equation Modeling* (3 Edition, Issue July). Routledge, Taylor & Francis Group.
- Schuster, N. (2022). New Work in China – Work From Home, 996 and Employee Motivation. *International Journal of Academic Research in Business and Social Sciences*, 12(3), 428–440. Available at: <https://doi.org/10.6007/ijarbss/v12-i3/12885>
- Seftyandra, F., & . A. (2020). Key Indicators Influencing Team Effectiveness in Project-Based Team. *KnE Social Sciences*, 2020, 166–173. Available at: <https://doi.org/10.18502/kss.v4i3.6395>
- Sekaran, U., & Bougie, R. (2013). *Research Methods for Business: A Skill-Building Approach* (6th Edition). New York, NY: Wiley.
- Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill-Building Approach*. Wiley & Sons Ltd. Available at: <https://doi.org/10.1108/lodj-06-2013-0079>
- Semvua, S., Naikuru, S., & Maina, R. (2024). Team Communication and Employee Performance in Commercial Banks in Tanzania. *Journal of Human Resource & Leadership*, 4(1), 1–15. Available at: <https://doi.org/10.70619/vol4iss1pp1-15>
- Sénquiz-Díaz, C., & Ortiz-Soto, M. (2019). A multifold perspective of knowledge sharing and virtual teams: The development of an IMOI model. *Journal of Technology Management and Innovation*, 14(2), 88–96. Available at: <https://doi.org/10.4067/s0718-27242019000200088>
- Sergey, B., Denis, B., Natalia, B., & Victoria, B. (2020). The Complementary Technique in Emotional Infection of the Virtual Project Team. *2020 IEEE 15th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2020 - Proceedings*, 2, 135–140. Available at: <https://doi.org/10.1109/CSIT49958.2020.9322044>
- Showell, C. J. (2023). *Effectiveness of Government Leadership to Maintain Productivity in a Virtual Environment* (Issue December). Liberty University, School of Business.
- Sia, J. K. M., & Abbas Adamu, A. (2020). Facing the unknown: pandemic and higher education in Malaysia. *Asian Education and Development Studies*. Available at: <https://doi.org/10.1108/AEDS-05-2020-0114>

- Šimová, T., & Zychová, K. (2023). *Who and What Is Driving the Remote Working Research? A Bibliometric Study*. 1–30. Available at: <https://doi.org/10.1177/09722629221139064>
- Singh, R. (2021). Information Exchange at a Distance: Examining the Influence of Leadership on Knowledge Sharing in Virtual Teams. *Journal of the Australian Library and Information Association*, 70(2), 125–138. Available at: <https://doi.org/10.1080/24750158.2020.1761090>
- Singh, S. K., Mazzucchelli, A., Vessal, S. R., & Solidoro, A. (2021). Knowledge-based HRM practices and innovation performance: Role of social capital and knowledge sharing. *Journal of International Management*, 27(1), 100830. Available at: <https://doi.org/10.1016/j.intman.2021.100830>
- Sinz, S. (2020). *The Role of Informal Social Interactions in Predicting Team Cohesion and Performance* (Issue August). Concordia University.
- Soon, C. C., & Salamzadeh, Y. (2020b). The Impact of Digital Leadership Competencies on Virtual Team Effectiveness in MNC Companies In Penang, Malaysia. *Journal of Entrepreneurship, Business and Economics*, 8(2), 219–253. Available at: <http://orcid.org/0000-0002-6917-2754>
- Subramaniam, G., Ramachandran, J., Putit, L., & Shariff, S. H. (2021). Exploring Malaysian academics' perception on working from home (WFH) as a flexible working arrangement during Covid-19 pandemic. *SMART Journal of Business Management Studies*, 17(2), 54–64. Available at: <https://doi.org/10.5958/2321-2012.2021.00017.8>
- Sulaiman, A. A., & Effendi, A. A. (2022). An Assessment of the Effect of Work from Home on Academic Worker's Well-Being in Malaysian Higher Educational Institutions. *Global Business and Management Research: An International Journal*, 14(3).
- Suriyani, W., Wan, C., & Yahya, Y. (2023). Assessment of Well-Being and Work From Home Among University Employees During The Movement Control Order (MCO) in Malaysia. *International Journal for Studies on Children, Women, Elderly and Disabled*, 19, 24–29.
- Swanson, E., Kim, S., Lee, S. M., Yang, J. J., & Lee, Y. K. (2020). The effect of leader competencies on knowledge sharing and job performance: Social capital theory. *Journal of Hospitality and Tourism Management*, 42(December 2018), 88–96. Available at: <https://doi.org/10.1016/j.jhtm.2019.11.004>
- Swart, K., Bond-Barnard, T., & Chugh, R. (2022). Challenges and critical success factors of digital communication, collaboration and knowledge sharing in project management virtual teams: A systematic literature review. *International Journal of Information Systems and Project Management*, 10(4), 59–75. Available at: <https://doi.org/10.12821/ijispm100404>

- Syynimaa, K., Lainema, K., & Lainema, T. (2022). Identifying Challenges in Virtual Teams: a Case Study of Teamwork in a Game-Based Learning Environment. *Proceedings of the 19th International Conference on Cognition and Exploratory Learning in the Digital Age, CELDA 2022, Celda*, 97–104. Available at: https://doi.org/10.33965/celda2022_2022071013
- Tabachnick, B. G., & Fidell, L. S. (2013). Using Multivariate Statistics. In *Contemporary Psychology: A Journal of Reviews* (Edition, 6, Vol. 28, Issue 8). Pearson Education. Available at: <https://doi.org/10.1037/022267>
- Tan, C. K., Ramayah, T., Teoh, A. P., & Cheah, J. H. (2019). Factors influencing virtual team performance in Malaysia. *Kybernetes*, 48(9), 2065–2092. Available at: <https://doi.org/10.1108/K-01-2018-0031>
- Thanthony, S. (2021). Communication patterns and team performance within agile software development projects. In *UNIVERSITY of JOHANNESBURG* (Vol. 53, Issue 4).
- Topaloglu, M., & Anac, A. S. (2021). Exploring Major Factors Affecting Virtual Team Performance. *European Journal of Business and Management Research*, 6(5), 107–114. Available at: <https://doi.org/10.24018/ejbmr.2021.6.5.1071>
- Torre, T., & Sarti, D. (2020). The “way” toward e-leadership: Some evidence from the field. *Frontiers in psychology*, 11, 554253. Available at: <https://doi.org/10.3389/fpsyg.2020.554253>
- Torro, O., Holopainen, J., Jalo, H., Pirkkalainen, H., & Lähtevänoja, A. (2022). How to get things done in social virtual reality – A study of team cohesion in social virtual reality-enabled teams. *Proceedings of the 55th Hawaii International Conference on System Sciences*, 7, 470–479. Available at: <https://doi.org/10.24251/hicss.2022.057>
- Tsen, M. K., Gu, M., Tan, C. M., & Goh, S. K. (2021). Does flexible work arrangements decrease or increase turnover intention? A comparison between the social exchange theory and border theory. *International Journal of Sociology and Social Policy*. Available at: <https://doi.org/10.1108/IJSSP-08-2021-0196>
- Tseng, F. C., Cheng, T. C. E., Yu, P. L., Huang, T. L., & Teng, C. I. (2019). Media richness, social presence and loyalty to mobile instant messaging. *Industrial Management and Data Systems*, 119(6), 1357–1373. Available at: <https://doi.org/10.1108/IMDS-09-2018-0415>
- Turesky, E. F., Smith, C. D., & Turesky, T. K. (2020). A call to action for virtual team leaders: practitioner perspectives on trust, conflict and the need for organizational support. *Organization Management Journal, ahead-of-p*(ahead-of-print). Available at: <https://doi.org/10.1108/omj-09-2019-0798>

- Vahdat, S. (2022). The role of IT-based technologies on the management of human resources in the COVID-19 era. *Kybernetes*, 51(6), 2065–2088. Available at: <https://doi.org/10.1108/K-04-2021-0333>
- Velez-Calle, A., Mariam, M., Gonzalez-Perez, M. A., Jimenez, A., Eisenberg, J., & Santamaria-Alvarez, S. M. (2020). When Technological Savviness Overcomes Cultural Differences: Millennials In Global Virtual Teams. *Critical Perspectives on International Business*, 16(3), 279–303. Available at: <https://doi.org/10.1108/cpoib-01-2018-0012>
- Waititu, P., & Barker, R. (2023). Employees' Perceptions on the use of Online Internal Communication for Knowledge Sharing. *Electronic Journal of Knowledge Management*, 21(2), 103–113. Available at: <https://doi.org/10.34190/EJKM.21.2.2947>
- Wan, C. Da, & Abdullah, D. (2021). Internationalisation of Malaysian higher education: policies, practices and the SDGs. *International Journal of Comparative Education and Development*, 23(3), 212–226. Available at: <https://doi.org/10.1108/IJCED-08-2020-0052>
- Watanuki, H. M., & De Oliveira Moraes, R. (2016). Does size matter? An investigation into the role of virtual team size in IT service provisioning. *Industrial Management and Data Systems*, 116(9), 1967–1986. Available at: <https://doi.org/10.1108/IMDS-07-2015-0300>
- Wei, L. H., Thurasamy, R., & Popa, S. (2018). Managing virtual teams for open innovation in Global Business Services industry. *Management Decision*, 56(3), 570–590. Available at: <https://doi.org/10.1108/MD-08-2017-0766>
- Wickramasinghe, V., & Nandula, S. (2015). Diversity in team composition, relationship conflict and team leader support on globally distributed virtual software development team performance. *Strategic Outsourcing: An International Journal*, 8(1), 2–22. Available at: <https://doi.org/10.1108/SO-02-2015-0007>
- Willox, S., Morin, J., & Avila, S. (2023). Benefits of individual preparation for team success: planning for virtual team communication, conflict resolution and belonging. In *Team Performance Management* (Vol. 29, Issues 1–2, pp. 1–14). Available at: <https://doi.org/10.1108/TPM-03-2022-0022>
- Winter, A. (2020). Problems working in semi and full-time virtual teams : Comparison of virtual team problems pre and post-Covid 19 epidemic CC-BY-NC. *University of Twente*, 1–33. Available at: <http://essay.utwente.nl/81932/>
- Wisesa, A., Karim, D., & Gustomo, A. (2021). Bridging Multicultural Characteristics in Virtual Team: A Systematic Literature Review. *Proceedings of the 1st International Conference on Research in Social Sciences and Humanities (ICORSH 2020)*, 584(Icorsh 2020), 492–502. Available at: [10.2991/assehr.k.211102.063](https://doi.org/10.2991/assehr.k.211102.063)

- Wojciechowska-Dzięcielak, P. M. (2020). Knowledge sharing facilitators and barriers in the context of group cohesion — A literature review. *International Journal of Information and Education Technology*, 10(1), 31–36. Available at: <https://doi.org/10.18178/ijiet.2020.10.1.1335>
- Wut, T. M., Ng, P. M. L., & Low, M. P. (2024). Engaging university students in online learning: a regional comparative study from the perspective of social presence theory. *Journal of Computers in Education*, 11(3), 763–789. Available at: <https://doi.org/10.1007/s40692-023-00278-8>
- Xu, S. (Tracy), Wang, Y. C., & Ma, E. (2022). A workplace-driven model on the formation of OCB-C: perspectives of social exchange theory and agency theory. *International Journal of Contemporary Hospitality Management*, 34(7), 2684–2703. Available at: <https://doi.org/10.1108/IJCHM-11-2021-1409>
- Yaghmai, M., & Bøe, T. K. (2021). *Leader's Social Presence and Work Engagement in Virtual Teams: The Moderating Role of Media Richness*. BI Norwegian Business School.
- Yang, E., Kim, Y., & Hong, S. (2023). Does working from home work? Experience of working from home and the value of hybrid workplace post-COVID-19. *Journal of Corporate Real Estate*, 25(1), 50–76. Available at: <https://doi.org/10.1108/JCRE-04-2021-0015>
- Yin, K., Niu, J., Dong, N., Zhang, K., & Ashok, M. (2023). A meta-analysis of horizontal leadership and knowledge sharing. *Current Psychology*, December. Available at: <https://doi.org/10.1007/s12144-023-05503-2>
- Yoon, P., & Leem, J. (2021). The influence of social presence in online classes using virtual conferencing: Relationships between group cohesion, group efficacy, and academic performance. *Sustainability (Switzerland)*, 13(4), 1–19. Available at: <https://doi.org/10.3390/su13041988>
- Yu, G., Yang, J., & Chin, T. (2022). Free trade areas as cross-cultural knowledge-sharing platforms: evidence from the Sino-Vietnam case. *Journal of Knowledge Management*, 26(10), 2772–2783. Available at: <https://doi.org/10.1108/JKM-08-2021-0652>
- Yun, Y., Tham, J., & Azam, S. M. F. (2020). Impacts of Conflicts on Team Trust and Team Performance: an Empirical Study on University Scientific Research Teams in Jiangsu Province, China. *European Journal of Human Resource Management Studies*, 4(4), 23–39. Available at: <https://doi.org/10.46827/ejhrms.v4i4.945>
- Za, S., & Braccini, A. M. (2012). Designing 3D virtual world platforms for e-learning services. new frontiers of organizational training. *Lecture Notes in Business Information Processing*, 103 LNBIP(February), 284–296. Available at: https://doi.org/10.1007/978-3-642-28227-0_21

- Zaharie, M. (2021). Challenges, trust and performance in virtual teams: examining the role of openness to experience and preference for virtual teams. *Team Performance Management*, 27(3–4), 210–228. Available at: <https://doi.org/10.1108/TPM-07-2020-0066>
- Zander, L., Kang, O., Mockaitis, A. I., & Zettinig, P. (2021). The dual role of trust in creative global virtual teams: Implications for leadership in times of crisis. *International Business and Management*, 36, 157–175. Available at: <https://doi.org/10.1108/S1876-066X20220000036014>
- Zaw, K. T. (2022). *The Effect of Virtual Leadership Practices on Work Engagement And Employee Performance In Myanmar Telecommunication Industry* (Issue 59). Yangon University of Economics.
- Zeb, A., Goh, G. G. G., Javaid, M., Khan, M. N., Khan, A. U., & Gul, S. (2023). The interplay between supervisor support and job performance: implications of social exchange and social learning theories. *Journal of Applied Research in Higher Education*, 15(2), 429–448. Available at: <https://doi.org/10.1108/JARHE-04-2021-0143>
- Zeuge, A., Weigel, A., Bjorn, N., Frederike, O., & Michael, S. (2020). *Leading Virtual Teams -A Literature Review Leading Virtual Teams – A Literature Review*. August.
- Zhang, Y., Zhao, R., & Yu, X. (2022). Enhancing virtual team performance via high-quality interpersonal relationships: effects of authentic leadership. *International Journal of Manpower*, 43(4), 982–1000. Available at: <https://doi.org/10.1108/IJM-08-2020-0378>
- Zhao, X. M., Ye, X. Q., & Zhu, D. Y. (2008). A novel compound isolated from the peels of Citrus changshan-huyou Y. B. Chang. In *Yaoxue Xuebao* (Vol. 43, Issue 12).
- Zheng, Y., Zheng, X. (Janey), Wu, C.-H., Yao, X., & Wang, Y. (2021). *Newcomers' Relationship-Building Behavior, Mentor Information Sharing And Newcomer Adjustment: The Moderating Effects Of Perceived Mentor And Newcomer Deep Similarity*. University of Sheffield Conduit.
- Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2010). *Business Research Methods* Eight Edition. Cengage Learning., 668.
- Zoltek, G. A. (2020). *Team members' perspectives on communication after the transition to virtual teams due to the COVID-19 outbreak*.
- Zuofa, T., & Ochieng, E. G. (2021a). Investigating barriers to project delivery using virtual teams. *Procedia Computer Science*, 181(2019), 1083–1088. Available at: <https://doi.org/10.1016/j.procs.2021.01.304>

Websites

Malaysian National News Agency, BERNAMA (2020). Available at:
<https://www.bernama.com/en/>

Malaysian Qualifications Agency, MQA (2022). Available at:
<https://www.mqa.gov.my/>

Malaysia's National Statistics Organisation, MNSO (2024). Budget. Available at:
<https://open.dosm.gov.my/>

Ministry of Education Malaysia, MHE (2022). Available at:
<https://www.mohe.gov.my/en>

World University Rankings, QS (2024). Available at:
<https://www.topuniversities.com/>



APPENDIX 1

REQUEST FOR PERMISSION TO DISTRIBUTE THE QUESTIONNAIRES

 الجامعة الإسلامية العالمية ماليزيا INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA <i>Garden of Knowledge and Virtue</i>		LEADING THE WAY KHALIFAH - AMANAH - IQRA' - RAHMATAN UL-ALAMIN SUSTAINABILITY INSTITUTION OF THE YEAR KULLIYAH OF ECONOMICS AND MANAGEMENT SCIENCES
IIUM/302/12/14/1/G1911311 4 April 2023		
TO WHOM IT MAY CONCERN		
<i>Assalamu 'alaikum and Salam Sejahtera,</i> Dear Sir/Madam, REQUEST FOR A PERMISSION TO DISTRIBUTE THE QUESTIONNAIRES FOR RESEARCH NAME OF STUDENT : ALKOUD SALEH MATRIC NO. : G1911311 PASSPORT NO. : 013990522 NATIONALITY : SYRIA We wish to inform you that the above named student is pursuing his Doctor of Philosophy (Business Administration) at Kulliyah of Economics and Management Sciences (KENMS), International Islamic University Malaysia (IIUM). We appreciate if you could assist him to respond to the questionnaires prepared by him for his thesis entitled "The Role of Social Presence and Virtual Leadership in Enhancing the Virtual Teams Performance in the Higher Education Sector in Malaysia: Knowledge Sharing as a Mediator" under the supervision of Dr. Dolhadi bin Zainudin and Prof. Dr. Suhaimi bin Mhd Sarif from the Department of Business Administration. The information obtained will be used solely for the research purpose only and will be treated as confidential. Your kind cooperation is highly appreciated. Thank you.  ASSOC. PROF. DR. ZULKUFLY RAMLY Deputy Dean (Postgraduate and Responsible Research) Kulliyah of Economics and Management Sciences c.c Student's File		
Kulliyah of Economics and Management Sciences International Islamic University Malaysia Jalan Gombak 53100 Kuala Lumpur, Malaysia Telephone: (+603) 6421 4778 Fax: (+603) 6421 4850		       
QR Code		

APPENDIX 2

STUDY PROTOCOL

LEADING THE WAY KHALIFAH - AMANAH - IKRAH - RAHMATAN LIL'ALAMIN SUSTAINABILITY INSTITUTE OF THE YEAR	
RESEARCH MANAGEMENT CENTRE (RMC)	
Our Ref. : IIUM/504/14/11/2/ IREC 2023-090 Date : 23 May 2023 Bro. Saleh Alkoud (Principal Investigator) A11-10, Pr6 Platinum hill Condominium, Jalan Melati Utama 1 Taman Melati 53100 Kuala Lumpur Dear Bro., The IIUM Research Ethics Committee (IREC) has reviewed your study protocol as mentioned below:- ID NO. : IREC 2023-090 RESEARCH TITLE : The Role Of Social Presence And Virtual Leadership In Enhancing The Virtual Teams Performance In The Higher Education Sector In Malaysia: Knowledge Sharing As A Mediator REGISTRATION DATE : 05 May 2023 CO-INVESTIGATOR : Assist. Prof.Dr. Dolhadi Zainudin Prof. Dr. Suhaimi Mhd Sarif STUDY SITE : The study will be conducted on administrative staff in Malaysian universities in various states SAMPLE SIZE : 240 ETHICAL EXPIRY DATE : 19 May 2024 The IIUM Research Ethics Committee (IREC) operates in accordance to the Declaration of Helsinki, International Conference of Harmonization Good Clinical Practice Guidelines (ICH-GCP), Malaysia Good Clinical Practice Guidelines and Council for International Organizations of Medical Sciences (CIOMS) International Ethical Guidelines The following documents have been received and reviewed to the above study:- 1. Study Proposal/Protocol: Version 1, dated 05 May 2023 2. Informed Consent Form (ICF) – i. Information Sheet (English) – Version 1, dated 17 May 2023 ii. Consent Form (English) - Version 1, dated 17 May 2023 3. Questionnaire - Version 1, dated 05 May 2023 4. Approval Letter from Kulliyah of Economics and Management Sciences, IIUM 5. Principal Investigator's CV	
Research Management Centre International Islamic University Malaysia, Jalan Gombak, 53100 Kuala Lumpur Telephone: (+603) 6421 5002 / 5010 Fax: (+603) 6421 4862 Email: rescentre@ium.edu.my Website: https://www.ium.edu.my/centre/mc	

Decision by IIUM Research Ethics Committee (IREC):

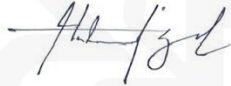
(√) Approved
() Disapproved

Date of Approval: 19 May 2023

The investigator(s) are required to:

- a) submit the 'Continuing Review Form' 30 days before EXPIRY DATE to renew Ethical Approval.
- b) notify IREC of any change in protocol and obtaining further ethical approval as appropriate.
- c) report any adverse incident during the course of a study to IREC even if the incident is not directly related to the study.
- d) report to the IREC within 72 hours for all internal SAEs (occurring in IIUM PI site).
- e) report in a prompt manner if the information impacts the continued ethical acceptability of the trial for external SAEs (occurring in participants at other sites).
- f) report any major protocol deviation occurs within 5 working days.
- g) complete and submit the End of Project Report Form to the IREC Secretariat's Office.
- h) All records and data subjects are CONFIDENTIAL and used only for the purposes of this study and all issues and procedures on data confidentiality must be observed.

Yours sincerely,



PROF. DR. NASSER MUHAMMAD AMJAD
Chairman
IIUM Research Ethics Committee (IREC)

DISCLAIMER: The approval letter only covers the ethical aspect of your study only. Any other permission/approval to use any facilities, data or human resource should fall under applicant's responsibility.

APPENDIX 3

QUESTIONNAIRE

	INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA	INTERNATIONAL ISLAMIC UNIVERSITY IN MALAYSIA FACULTY OF ECONOMICS AND MANAGEMENT SCIENCES BUSINESS ADMINISTRATION DEPARTMENT
---	--	---

**The Role of Social Presence and Virtual Leadership in Enhancing
The Virtual Teams Performance in the Higher Education Sector in
Malaysia: Knowledge Sharing as a Mediator**

Dissertation

SALEH ALKOUD

(G1911311)

QUESTIONNAIRE

Dear participant.

Peace, Mercy and Blessings of God

In your hands, a research proposal in business administration entitled:

The Role of Social Presence and Virtual Leadership in Enhancing The Virtual Teams Performance in the Higher Education Sector in Malaysia: Knowledge Sharing as a Mediator

This research considers as requirements of the stage of Doctorate in Business Administration at the International Islamic University in Malaysia (IIUM). We kindly ask you to answer questions accurately and objectively, and we assure you that they are confidential data and are used for practical research purposes only. Your participation represents a valuable contribution and your precious time is highly appreciated. Your participation is voluntary and you can withdraw from the study at any time without giving the reason(s). Thank you in advance for your kind effort and cooperation.

The Researcher

Saleh Alkoud

salehalkoud@gmail.com

Variables	Operational Definition	Source
Cohesion	Lin et al. (2008) have defined Cohesion as “a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuits of its instrumental objectives and/or for the satisfaction of member affective needs”.	Lin et al. (2008)
Trust	Choi et al. (2008) have defined Trust as “The willingness of virtual projects team members to be reliant on each other based on the expectation that each member will perform actions beneficial to the success of the team”.	Choi et al. (2008)
Relationship Building	According to Lin et al. (2008), Relationship Building includes “an interaction processed designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust”.	Lin et al. (2008)
Communication	Wei et al. (2018) have defined Communication as “The transition of information and understanding through the use of common symbols (verbal or nonverbal) between two or more team members in the appropriate manner”.	(Wei et al., 2018)
Virtual Leadership	Avolio (2007) and Bass & Bass (2008) have defined Virtual Leadership as “Virtual leadership is characterized as a process of social influence embedded in both proximal and distal AIT- mediated contexts that can change attitudes, emotions, thought, actions and performance”.	(C. P. Lin et al., 2019)
Media Richness	Dennis and Kinney (1998) have defined Media richness as “the degree to which a medium can facilitate shared meaning”.	(Dennis & Kinney, 1998)
Knowledge Sharing	Park and Lee, (2014) have defined “Knowledge sharing is the process of transferring and sharing knowledge among individuals or teams to reduce the time spent on solving a business problem” .	(Pangil & Chan, 2014)
Virtual Team Performance	Alkhatib and Darlington (2015) have defined Virtual Team Performance as “The ability of team members to achieve results consistent with the goals, taking into account the effect of these results on employees, and for this, the effectiveness of the team can be determined by the performance of the team and the satisfaction of its members”.	(Alkhatib and Darlington , 2015) & Baruch and Lin 2012.
Virtaul Team	Bhagat et al. (2011) have defined Virtual teams as “Groups of people who are dispersed in terms of space and time and use ICTs to accomplish their tasks.”	(Velez-Calle et al.,2020)
Team Tenure	Robert and You (2018) have defined Team Tenure as “The number of days the team existed”.	(Robert & You, 2018)
Team Size	Robert and You (2018) have defined Team Size as “How many people were on the team?”.	(Robert & You, 2018)

Respondents to this questionnaire must meet the following criteria:							
1- They have worked in the higher education sector in Malaysia, in Malaysian universities.							
2- They have worked as administrative employees, not as academics.							
3- They have worked virtually partially or completely Using ICT during covid-19 and beyond.							
4- They have worked in a virtual team during covid-19 and beyond.							
First Section: University Information							
University:							
Unit/Department:							
Second Section: Diversity in Virtual Team							
No	Statement	Diversity in Virtual Team*					
*The operational definition of the term Virtual Team in the current study refers to administrative (non-academic) employees in a department or unit who have performed their duties partially or wholly using the Internet during Covid-19 and beyond.							
Gender Diversity							
1	Gender	Male			Female		
Socio-Economic Diversity							
2	Education	Secondary School	Diploma	Bachelor	Master	Doctorate	Others
3	Occupation What is your position in virtual team?	Member			Leader		
Generational Diversity							
4	Birth year	Traditionalists	Baby Boomers	Generation X	Millennials	Generation Z	
		(born before 1946)	(born 1946-1964)	(born 1965-1980)	(born 1981-1996)	(born after 1997)	
National Diversity							
5	Nationality	Malaysian			Non- Malaysian		
Ethnic Diversity							
6	Race	Malay	Chinese	Indian	Other		
Linguistic Diversity							
7	What is the language used to communicate between your team members?	Malay	Chinese	Indian	English	Other	
Religious Diversity							
8	Religion	Islam	Christianity	Hinduism	Buddhism	Other	

ICT Diversity						
9	What types of digital media do you use to communicate with your team at work?	Text-based media		Audio-based media	Video-based media	Multimedia-based media
		Emails, Chat messages, and social media posts		Phone calls and Voice messages	Video Conferencing and Webinars.	It use of a combination of text, audio, and visual elements, such as social media posts that include images or videos.
10	Experience in Using ICT in Workplace	Below 5	5-10	11-15	16-20	21 or above
Time Zones Diversity						
11	What time zone does the team work in?	Same Time Zone			Different Time Zones	
Geographical Diversity						
12	What geographic area does your team operate in (Workplace)?	Same Region			Different Regions	
Third Section: Virtual Team Information						
13	Team Size	Fewer than 10	11-20	21-30	31-40	41 or above
14	Team Tenure	Fewer than 3 months	3-6 months	6-12 months	12 -18 months	18 months and above
15	During Covid-19, what is the methods of working for your team?	Traditional Work		Virtual Work		Both: Hybrid Work
16	After Covid-19, what is the methods of working for your team?	Traditional Work		Virtual Work		Both: Hybrid Work

Fourth Section: Social Presence Components

1-Trust

No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
1	I believe my virtual team members are honest.					
2	I believe my virtual team members are reliable.					
3	I think my virtual team members treat each other with mutual trust.					
4	I think my virtual team members work for the team's success.					
5	I believe my virtual team members are knowledgeable in their respective areas.					
6	I believe my virtual team members are competent in their respective areas.					

2- Cohesion

No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
7	My virtual team members work as a very cohesive unit.					
8	My virtual team members are working effectively as a cohesive unit.					
9	My virtual team members work well together.					
10	My virtual team members spend time together through ICT.					

3- Relation Building

No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
11	My virtual team members rely on each other.					
12	My virtual team members consult each other when they need support.					
13	My virtual team members experience a sense of shared goals and objectives.					
14	My virtual team members understand the information shared between them as a team.					
15	My virtual team members share information as one team.					
16	My virtual team members are interested in building a good relationship with one another.					

4- Communication

No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
17	When I communicate with my virtual team members, they understand my concerns.					
18	When I communicate with my virtual team members, I can provide information as required.					
19	When I communicate with my virtual team members, I express my opinion in understandable terms.					
20	When I communicate with my virtual team members, I make sure they understand what I mean.					
21	When I communicate with my virtual team members, I treat them with respect.					
Fifth Section: Virtual Leadership						
The virtual leader is the team leader who uses digital media to communicate with team members in order to coordinate and facilitate the performance of tasks and achieve goals.						
No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
22	Our virtual team leader promotes learning from experience.					
23	Our virtual team leader promotes tolerating mistakes up to a certain point.					
24	Our virtual team leader acts as an adviser.					
25	Our virtual team leader considers 'control' as a strategy to accomplish the team objectives.					
26	Our virtual team leader promotes the acquisition of external knowledge.					
27	Our virtual team leader encourages employees to share and apply their knowledge.					
Sixth Section: Media Richness						
No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
28	Digital media are flexible, which helps achieve team goals.					
29	Digital media help us reach a common vision when opinions differ.					
30	Digital media help us share opinions among my virtual team members.					
31	Digital media help communicate ideas easily to my virtual team members.					
32	Digital media help us to communicate quickly with my virtual team members.					

33	Digital media help us understand each other better.					
34	Digital media help us speed up communication between my virtual team members.					
Seventh Section: Knowledge Sharing						
35	My virtual team members share their ideas openly.					
36	My virtual team members are willing to share knowledge with others.					
37	My virtual team members use the knowledge of team members.					
38	My virtual team members with expert knowledge are willing to help others in this team.					
39	My virtual team members keep their best ideas to themselves.					
40	My virtual team members share their knowledge without expecting anything in return.					
Eighth Section: Virtual Team Performance						
No	Statement	Strongly Disagree	Disagree	Natural	Agree	Strongly Agree
41	My virtual team members adhere to time schedules.					
42	My virtual team members adhere to the budget.					
43	My virtual team members are able to meet the team's goals.					
44	My virtual team members are able to meet the team's vision.					
45	My virtual team members have a reputation for work excellence.					
46	My virtual team members are productive.					
47	My virtual team members are sincere to improve our team's efficiency.					
48	Overall, my virtual team members' performances are satisfactory.					

We would like to thank you for your cooperation and your interest

To any enquiry:

Mail Address: salehalkoud@gmail.com. Mobile: +601123132330. WhatsApp: +601123132330.

APPENDIX 4

SAMPLE 1 OF INFORMED CONSENT TO COLLECT DATA

 الجامعة الإسلامية العالمية ماليزيا INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA Garden of Knowledge and Virtue		LEADING THE WAY KHALIFAH - AMANAH - IGBA - RAHMATAN LIL'ALAMIN SUSTAINABILITY INSTITUTION OF THE YEAR KULLIYAH OF ECONOMICS AND MANAGEMENT SCIENCES	
IIUM/302/12/14/1/G1911311 4 April 2023			
TO WHOM IT MAY CONCERN			
Assalamu 'alaikum and Salam Sejahtera,			
Dear Sir/Madam,			
REQUEST FOR A PERMISSION TO DISTRIBUTE THE QUESTIONNAIRES FOR RESEARCH			
NAME OF STUDENT	:	ALKOUD SALEH	 uni twin  Green Conn Awards WINNER 2022 SUSTAINABILITY INSTITUTION OF THE YEAR  GREATER GOMBAK RESEARCH CENTRE OF EXCELLENCE IN BUSINESS ADMINISTRATION  UNITED NATIONS UNIVERSITY  RECIPIENT AL-KHAWARIZMI EDUCATION AWARD 2020  Premier Digital Tech University  MOS MALAYSIAN ORGANIZATION OF STANDARDS  ISO 9001 CERTIFIED
MATRIC NO.	:	G1911311	
PASSPORT NO.	:	013990522	
NATIONALITY	:	SYRIA	
We wish to inform you that the above named student is pursuing his Doctor of Philosophy (Business Administration) at Kulliyah of Economics and Management Sciences (KENMS), International Islamic University Malaysia (IIUM). We appreciate if you could assist him to respond to the questionnaires prepared by him for his thesis entitled "The Role of Social Presence and Virtual Leadership in Enhancing the Virtual Teams Performance in the Higher Education Sector in Malaysia: Knowledge Sharing as a Mediator" under the supervision of Dr. Dolhadi bin Zainudin and Prof. Dr. Suhaimi bin Mhd Sarif from the Department of Business Administration. The information obtained will be used solely for the research purpose only and will be treated as confidential. Your kind cooperation is highly appreciated. Thank you.  ASSOC. PROF. DR. ZULKUFLY RAMLY Deputy Dean (Postgraduate and Responsible Research) Kulliyah of Economics and Management Sciences c.c Student's File <i>Acknowledged:</i>  21/4/22 Assoc. Prof. Ts. Dr. Lionel In Lian Aun Director Research Management Center (CERVIE) UCSI University, Kuala Lumpur c/o: GHR (Mrs. academics & Diff) Kulliyah of Economics and Management Sciences International Islamic University Malaysia Jalan Gombak 53100 Kuala Lumpur, Malaysia Telephone: (+603) 6421 4778 Fax: (+603) 6421 4850 			

APPENDIX 5

SAMPLE 2 OF INFORMED CONSENT TO COLLECT DATA

 **الجامعة الإسلامية العالمية ماليزيا**
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
Garden of Knowledge and Virtue

LEADING THE WAY
KHAUFAH · AMANAH · IQRA · RAHMATAN UL ALAMIN | SUSTAINABILITY INSTITUTE OF THE YEAR
KULLIYAH OF ECONOMICS AND MANAGEMENT SCIENCES

IIUM/302/12/14/1/G1911311
4 April 2023

TO WHOM IT MAY CONCERN

Assalamu'alaikum and Salam Sejahtera,

Dear Sir/Madam,

REQUEST FOR A PERMISSION TO DISTRIBUTE THE QUESTIONNAIRES FOR RESEARCH

NAME OF STUDENT : ALKoud SALEH
MATRIC NO. : G1911311
PASSPORT NO. : 013990522
NATIONALITY : SYRIA

We wish to inform you that the above named student is pursuing his Doctor of Philosophy (Business Administration) at Kulliyah of Economics and Management Sciences (KENMS), International Islamic University Malaysia (IIUM).

We appreciate if you could assist him to respond to the questionnaires prepared by him for his thesis entitled **"The Role of Social Presence and Virtual Leadership in Enhancing the Virtual Teams Performance in the Higher Education Sector in Malaysia: Knowledge Sharing as a Mediator"** under the supervision of Dr. Dollhadi bin Zainudin and Prof. Dr. Suhaimi bin Mhd Sarif from the Department of Business Administration.

The information obtained will be used solely for the research purpose only and will be treated as confidential.

Your kind cooperation is highly appreciated.

Thank you.



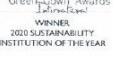
ASSOC. PROF. DR. ZULKUFLY RAMLY
Deputy Dean (Postgraduate and Responsible Research)
Kulliyah of Economics and Management Sciences

c.c. Student's File



PROF. DR. INDANG ARIATI ARIFFIN
Vice President
Research and International Affairs
Management and Science University











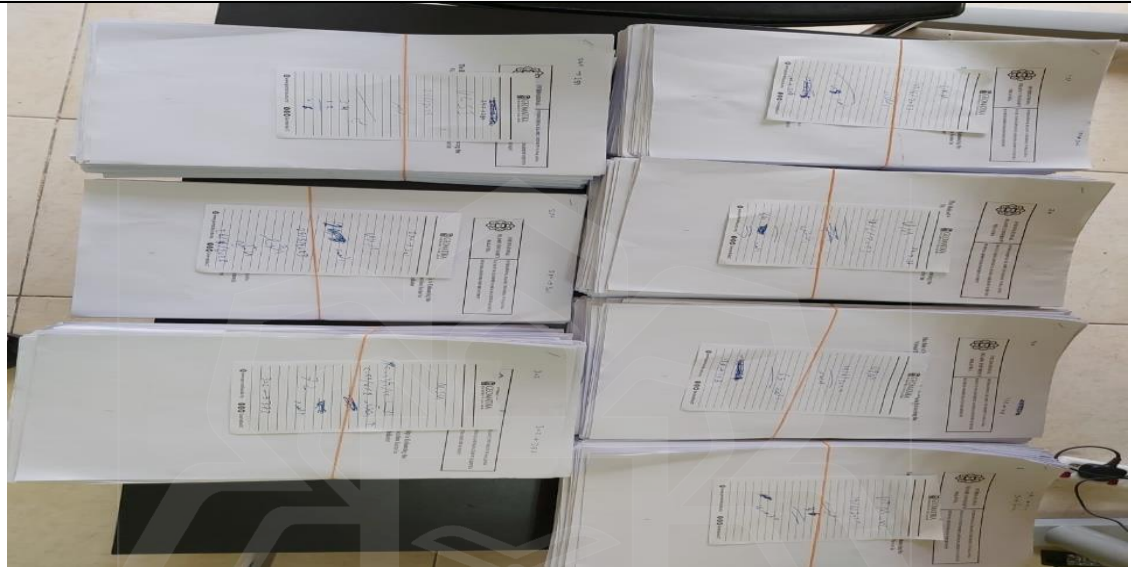
Kulliyah of Economics and Management Sciences
International Islamic University Malaysia
Jalan Gombak
53100 Kuala Lumpur, Malaysia
Telephone: (+603) 6421 4778 | Fax: (+603) 6421 4850



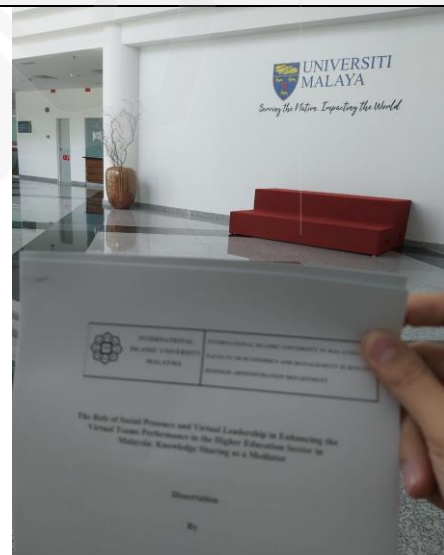
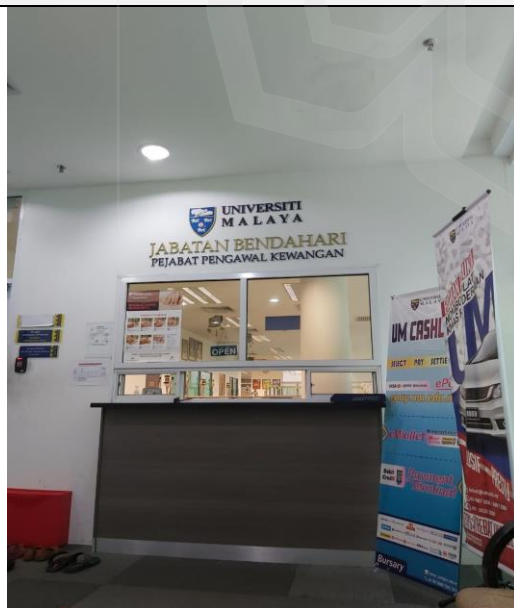
APPENDIX 6

SAMPLES OF DATA COLLECTION

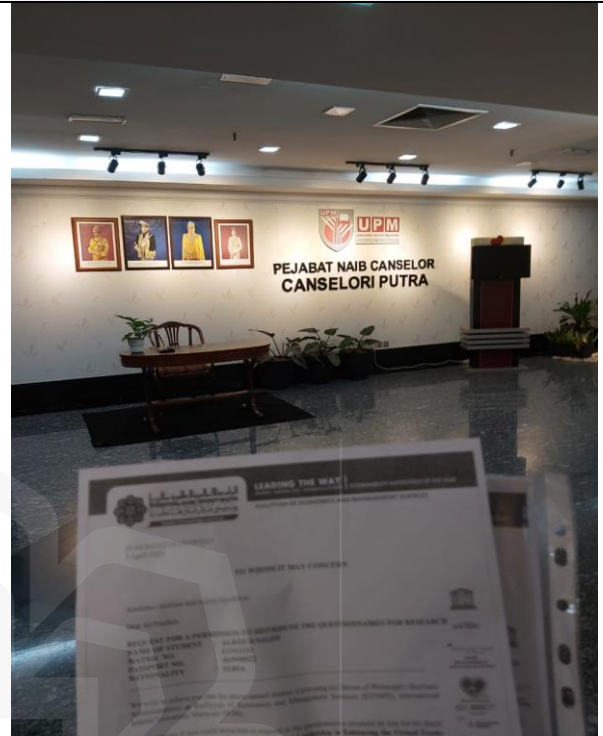
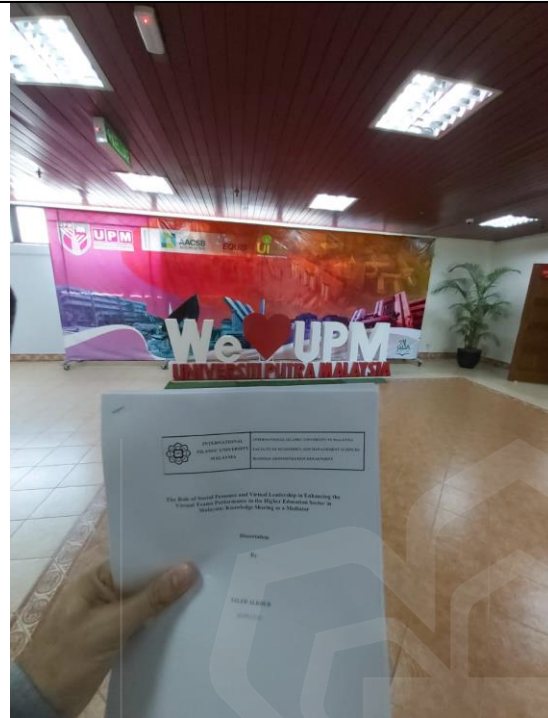
Samples of Data Collection



Data Collection in Malaya University-UM



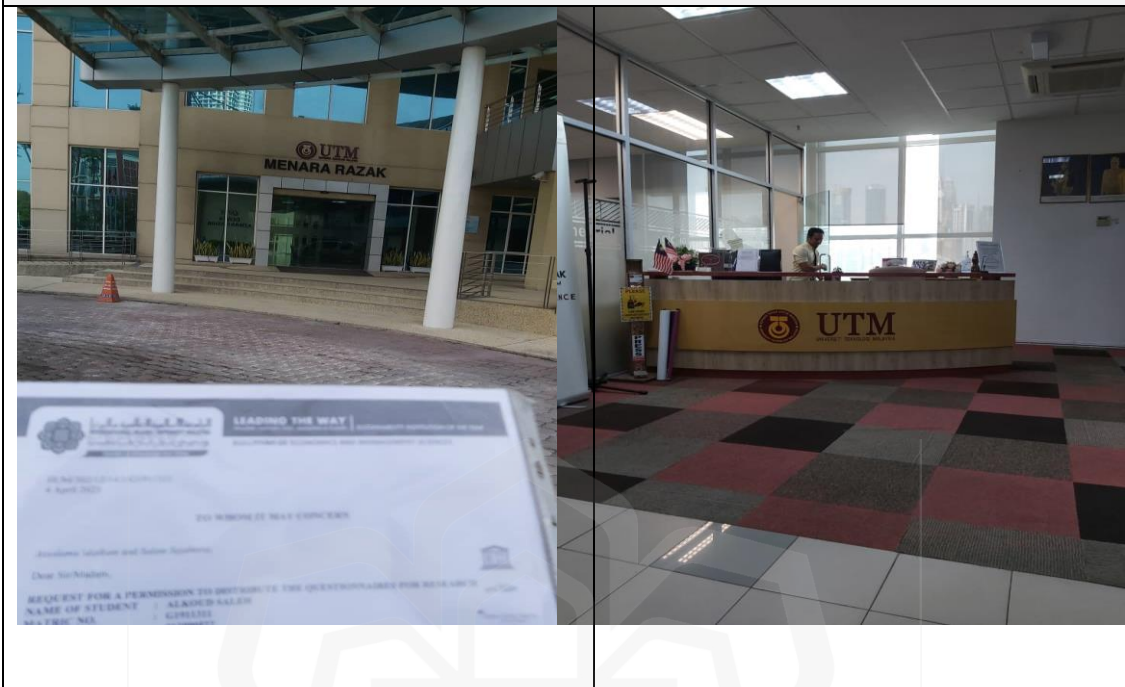
Data Collection in Universiti Putra Malaysia-UPM



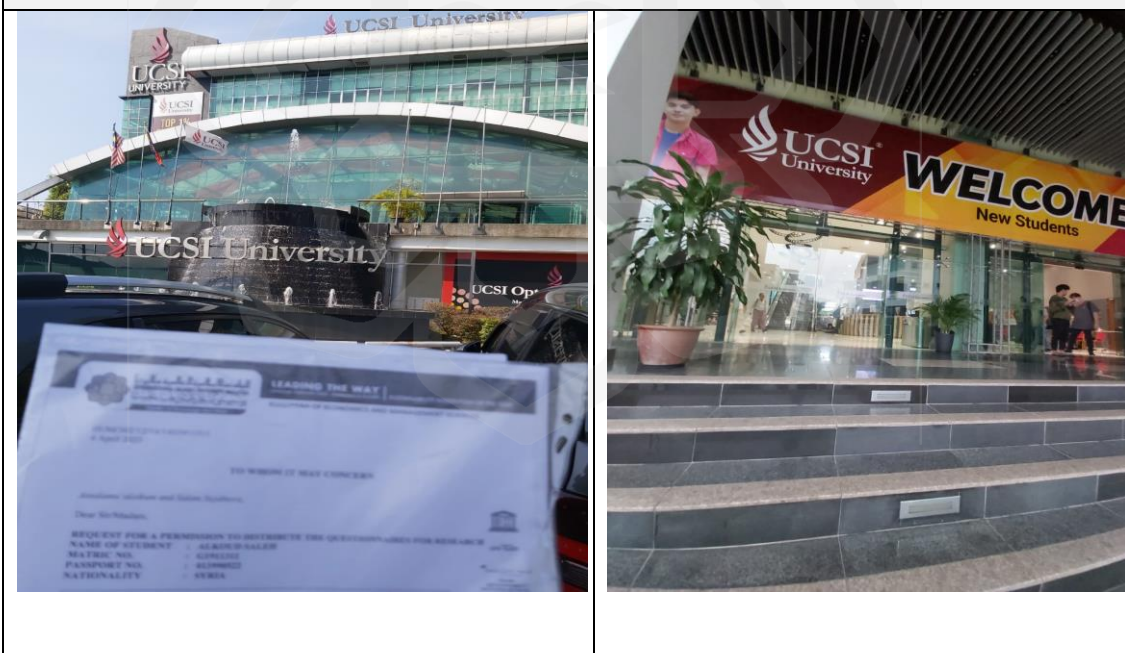
Data Collection in Universiti Kebangsaan Malaysia-UKM



Data Collection in Universiti Teknologi Malaysia- KL Campus-UTM



Data Collection in UCSI University



Data Collection in Universiti Utara Malaysia-UUM



Data Collection in Management and Science University-MSU



APPENDIX 7

SAMPLES OF RESEARCH INSTRUMENT VALIDATION

 INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA	INTERNATIONAL ISLAMIC UNIVERSITY IN MALAYSIA FACULTY OF ECONOMICS AND MANAGEMENT SCIENCES BUSINESS ADMINISTRATION DEPARTMENT
--	---

Assistant Professor. Dr. Zabeda Bt. Abdul Hamid

السلام عليكم ورحمه الله وبركاته

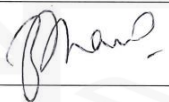
May this email reach you in the best health and Iman

In your hands, a research proposal in business administration entitled :**"The Role of Social Presence and Virtual Leadership in Enhancing The Virtual Teams Performance in the Higher Education Sector in Malaysia: Knowledge Sharing as a Mediator"**.

This research considers as requirements of the stage of Doctorate in Business Administration at Faculty of Economics and Administrative Sciences, the International Islamic University in Malaysia IIUM. The scale in its final form consists of sixth sections: the first section is related to the characteristics of the study sample, and the other sections are related to the eight research variables.

Since you are experienced and knowledgeable in the field of scientific research, please kindly comment on the following:

- The validity of the components of the scale, and their suitability to the subject of the study, and suggest necessary modifications.

Chairman	Main Supervisor	Researcher
Professor Suhaimi Bin Mhd. Sarif	Assistant Professor Dolhadi Bin Zainudin	Alkoud Saleh G1911311
Reviewer Information		
Name: Assistant Professor. Dr. Zabeda Bt. Abdul Hamid		
Workplace: IIUM Gombak, Campus		Position: Lecturer
Area of Specialisation: Economics, Business And Management ~ Economics, Business And Management ~ Human Resource Development (HRD) ~ Knowledge Management - Knowledge sharing, knowledge management tools and techniques.		
Contact Number: 4741		Email: zabeda@iium.edu.my
Signature: 		

The First Section: Primary Information						
No	Statement	Employee Information				
1	Gender	Male			Female	
2	Age	Below 20	20-30	31-40	41-50	51 or above
3	Experience	Below 5	5-10	11-15	16-20	21 or above
4	Education	Secondary School	Diploma	Bachelor	Master	Doctorate
Virtual Team Information* *The operational definition of the term Virtual Team in this study refers to administrative (non-academic) employees in a department or unit who have performed their duties partially or wholly using the Internet during Covid-19 and beyond.						
5	Position in Team	Member			Leadership	
6	Team Size	Fewer than 10	11-20	21-30	31-40	41 or above
7	Team Tenure	Fewer than 6 months	6-12 months	12-18 months	18-24 months	24 months and above
8	During the Corona period, did your team rely on ICT partially or completely?	Partially			Completely	
9	After Corona, what is the current methods of working for your team?	Traditional Work		Virtual Work	Hybrid Work	
Culture Diversity						
10	Nationality	Malaysian			Non- Malaysian	
11	Race	Malay	Chinese	Indian	Other	
ICT Diversity						
12	What types of digital media do you use to communicate with your team at work?	First Generation Technologies		Second Generation Technologies	Third Generation Technologies	
		Text, Audio		Video	Web Tools	
Time Zones Diversity						
13	What time zone does the team work in (Workplace)?	Same Time Zone			Different Time Zones	
Geographical Diversity						
14	What geographic area does your	Same Region			Different Region	

+ Others.

	team operate in (Workplace)?					
		Language Diversity				
15	What is the language used to communicate between your team members?	Malay	Chinese	Indian	English	Other



The Second Section: Social Presence Components

1-Trust

No	Statement	Appropriate	Inappropriate	Suggestions
1	I believe the other virtual team members team are honest and reliable.	✓		
2	I think other virtual team members treat each other with mutual trust.	✓		
3	I think other virtual team members work for the team's success.	✓		
4	I believe the other virtual team members are knowledgeable in their area. <i>respective areas of expertise</i>	✓		
5	I believe the other virtual team members are competent in their area. <i>respective areas of expertise</i>	✓		

2- Cohesion

No	Statement			
6	My virtual team members are a very cohesive unit.	✓		
7	My virtual team members get together as a group.			what do you mean by 'get together'?
8	My virtual team members work well together.	✓		
9	My virtual team members spend time together.	✓		Do you mean they get along well?

3- Relation Building

No	Statement			
10	My virtual team members rely on each other.	✓		
11	My virtual team members consulted each other when they need support.	✓		
12	My virtual team members experience a sense of shared goals and objectives.	✓		
13	My virtual team members understand the information shared between them as a team.	✓		
14	My virtual team members share information as one team. <i>are</i>	✓		
15	My virtual team members interested in building a good relationship with each other.	✓		

4- Communication

No	Statement			
16	When I communicate with my virtual team members, they understand my concerns.	✓		
17	When I communicate with members of my virtual team ^{members} , I can provide information as required.	✓		
18	When I communicate with my virtual team members, I express my opinion in understandable terms.	✓		
19	When I communicate with my virtual team members, I make sure they understand what I mean.	✓		
20	When I communicate with my virtual team members, I treat them with respect.	✓		
The Third Section: Virtual Leadership*				
*The virtual leader is the team leader who uses digital media to communicate with team members in order to coordinate and facilitate the performance of tasks and achieve goals.				
No	Statement			
21	Our virtual team leader promotes learning from experience.	✓		
22	Our virtual team leader promotes tolerating mistakes up to a certain point.	✓		
23	Our virtual team leader acts as an adviser.	✓		
24	Our virtual team leader consider controls ^{are} just an assessment of the accomplishment of objectives.	✓		
25	Our virtual team leader promotes the acquisition of external knowledge.	✓		
26	Our virtual team leader encourages employees to share and apply their knowledge.	✓		
The Fourth Section: Media Richness				
No	Statement			
27	Digital media facilitates reaching ^{an} agreement when there are different points of view.	✓		
28	Digital media helps us reach a common vision when opinions differ.	✓		
29	Digital media helps us share opinions among virtual team members.	✓		
30	Digital media helps communicate ideas easily to virtual team members.	✓		

You can also add:
my virtual team members share their knowledge without expecting anything in return

31	Digital media helped us to communicate quickly with virtual team members.	/		
32	Digital media helps us understand each other better.	/		
33	Digital media helps us speed up communication between virtual team members.	/		
The Fifth Section: Knowledge Sharing				
34	My virtual team members share their ideas openly.	/		
35	My virtual team members are willing to share knowledge/ideas with others.	/		
36	My virtual team members are using the knowledge/ideas of team members.	/		
37	My virtual team members with expert knowledge are willing to help others in this team.	/		
38	My virtual team members keep their best ideas to themselves.	/		
The Sixth Section: Virtual Team Performance				
No	Statement			
39	My virtual team members adhere to time schedules.	/		
40	My virtual team members adhere to the budget.	/		
41	My virtual team members are able to meet the department's goals.	/		
42	My virtual team members are able to meet the department's vision.	/		
43	My virtual team members have reputation for work excellence.	/		
44	My virtual team members are productive.	/		
45	My virtual team members improve team efficiency.	/		
46	Overall, my virtual team's member performance are satisfactory.	/		

We would like to thank you for your cooperation and your interest

To any enquiry:

Mail Address: salehalkoud@gmail.com. Mobile: +601123132330. WhatsApp: +60123132330.

 INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA	INTERNATIONAL ISLAMIC UNIVERSITY IN MALAYSIA FACULTY OF ECONOMICS AND MANAGEMENT SCIENCES BUSINESS ADMINISTRATION DEPARTMENT
--	---

Nurita Binti Juhdi (Assoc. Prof. Dr.)

السلام عليكم ورحمة الله وبركاته

May this email reach you in the best health and Iman

In your hands, a research proposal in business administration entitled : **“The Role of Social Presence and Media Richness Factors in Enhancing the Virtual Teams Performance in The Higher Education Sector in Malaysia: Virtual Leadership as a Mediator.”**

This research considers as requirements of the stage of Doctorate in Business Administration at Faculty of Economics and Administrative Sciences, the International Islamic University in Malaysia IIUM. The scale in its final form consists of fifth sections: the first section is related to the characteristics of the study sample, and the other sections are related to the seven research variables.

Since you are experienced and knowledgeable in the field of scientific research, please kindly comment on the following:

- The validity of the components of the scale, and their suitability to the subject of the study.
- Suggest necessary modifications.

Chairman	Main Supervisor	Researcher
Professor Suhaimi Bin Mhd. Sarif	Assistant Professor Dolhadi Bin Zainudin	Alkoud Saleh G1911311
Reviewer Information		
Name: Nurita Binti Juhdi (Assoc. Prof. Dr.)		
Workplace: IIUM Gombak Campus	Position:	
Area of Specialisation: Economics, Business And Management ~ Economics, Business And Management ~ Human Resource Development (HRD) ~ Career Development		
Contact Number: 4743	Email: nurita@iium.edu.my	
Signature:		

The First Section: Primary Information						
No	Statement	Employee information				
1	Gander	Male			Female	
2	Age	Less than Below 20	20-30	31-40	41-50	51 or above More than 51
3	Position	Academic			Non Academic	
4	Experience	Less than 5	5-10	11-15	16-20	More than 21 20
5	Education	Secondary School	Diploma	Bachelor	Master	Doctorate
No	Statement	Virtual Team Information The respondents might be wondering what Team? Referring to dept, unit, division, ad-hoc, quality circle etc? Must give some definition in the survey form for respondents to know. Otherwise they will answer wrong. Virtual...again the respondents will wonder what it means				
6	Position in Team	Member			Leadership	
7	Nationality	Malaysian			Non- Malaysian	
8	Team-Race Diversity	Malay	Chinese	Indian	other	
9	Team Size	Fewer Less than 10	11-20	21-30	31-40	More than 41
10	Team Tenure The options given is too long. Some teams are adhoc and temporary that only last for 1 year or less.	Less than 10	11-20	21-30	31-40	More than 41
11	Experience in ICT Must specify ICT...vague	Primary		Intermediate		Advance
12	Types of Media Richness Using in your Virtual Team Does this include the offline/printed as	Text (Emails-group chat- Messenger...etc)	Audio (Recordings-telephone call-skype call...etc)	Video (video clips-video conference-web meeting...etc)	Face-to-Face Meeting	

	well? Otherwise it should be named as digital/electronic media				
13	Time Zone	Work in the same time zone of my workplace		Work in the different time zone of my workplace	
14	Team Geographical (geog...in terms region/state/country?) Distribution	Work in the same geographical area of my workplace		Work in the different geographical area of my workplace	
15	Remote Work Ratio I don't understand this...must specify	0-20%	21-40%	41-60%	61-80% 81-100%



The Second Section: Social Presence Components				
1- Trust				
No	Statement	Appropriate	Inappropriate	Suggestions
1	I believe that the other team members are honest and reliable. Replace that with the			
2	I believe that other team members treat each other reciprocally.			
3	I believe that other team members will act in their best interest.			
4	I believe that other team members are knowledgeable and competent in their area.			
2- Cohesion				
No	Statement	Appropriate	Inappropriate	Suggestions
5	My group is a very cohesive unit.			
6	My group members get together as a group.			
7	I feel my group members work together well.			
8	My group members spend time together.			
3- Relation Building				
No	Statement	Appropriate	Inappropriate	Suggestions
9	My group members relied on each other and consulted each other when they need support.			
10	My group members experience a sense of shared goals and objectives.			
11	Knowledge and information sharing are understood to be a group norm within my group.			
12	My group interested in building a good relationship with my group members....confusing			

4- Communication				
No	Statement	Appropriate	Inappropriate	Suggestions
13	When I communicate with my virtual team members, they understand my concerns.			
14	When I communicate with my virtual team members, I can give as much information as they wanted.			
15	When I communicate with my virtual team members, I communicate in terms that they could understand.... english			
16	When I communicate with my virtual team members, I will check to be sure they understood everything.			
17	When I communicate with my virtual team members, I treat them with respect.			
The Third Section: Virtual Leadership....again.what is virtual leadership? The items below are like normal leadership. What is virtual?				
No	Statement	Appropriate	Inappropriate	Suggestions
18	Our team leader promotes learning from experience, tolerating mistakes up to a certain point. This is double barrel...learning and tolerating are 2 different things. Must separate into two questions			
19	Our team leader acts as an adviser, and controls are just an assessment of the accomplishment of objectives.... too long. Simplify. Avoid double barrel			
20	Our team leader promotes the acquisition of external knowledge.			

21	Our team leader encourages employees to share and apply their knowledge.			
The Fourth Section: Media Richness				
No	Statement	Appropriate	Inappropriate	Suggestions
22	When we disagree, the communication conditions made it more difficult for us to come to agreement.	Negative statement		Why all negative statements? must also have positive or neutral statements
23	When we disagree, our communication environment helped us come to a common position.	Negative statement		
24	The conditions under which we are communicating got in the way of our sharing of opinions.???	Negative statement		
25	I could easily explain things in this environment.			
26	The communication conditions help us communicate quickly.			
27	I can't easily communicate some ideas to my partner because of the communication conditions.	Negative statement		
28	The communication condition under which we communicate helps us to better understand each other			
29	The communication condition under which we are communicating slowed down our communications.	Negative statement		
The Fifth Section: Virtual Team Performance...virtual? Again what does it mean?				
No	Statement	Appropriate	Inappropriate	Suggestions

30	My team adheres to time schedules.			
31	My team adheres to the budget.			
32	My team is able to meet department goals.			
33	My team is able to meet the vision department .			
34	My team has reputation for work excellence.			

I have one BIG concern. Did you adopt the above questions from reliable journal articles? There are many confusing statements (English errors, double barrel, confusing statements etc).

We would like to thank you for your cooperation and your interest

To any enquiry:

Mail Address: salehalkoud@gmail.com. Mobile: +601123132330. WhatsApp: +601123132330

APPENDIX 8 ABSTRACT VERIFY

ملخص البحث

تزايدت وظائف الفرق الافتراضية في أماكن العمل في السنوات الأخيرة، التي أضحت محل الفرق التقليدية. لذلك، اهتم الباحثون بكيفية تحسين أداء الفرق الافتراضية. تكمن مشكلة البحث الرئيسية في إعادة تقييم العوامل المؤثرة على أداء الفرق الافتراضية في قطاع مؤسسات التعليم العالي في ماليزيا لدعم إنشاء فرق افتراضية فعالة تساهم في نجاح المؤسسات وبقائها. تهدف الدراسة الحالية إلى اختبار دور مكونات الحضور الاجتماعي (بناء العلاقات، الثقة، التماسك، والتواصل) والقيادة الافتراضية في تعزيز أداء فرق العمل الافتراضية في قطاع التعليم العالي في ماليزيا. هدفت الدراسة إلى اختبار الدور الوسيط لتبادل المعرفة، والدور المعدل للثراء الإعلامي في العلاقات السابقة. اعتمد البحث الحالي على المنهج الكمي، فقد أجري مسح باستخدام الاستبيان، وتم الحصول على بيانات من 373 موظفاً إدارياً من موظفي الجامعات الماليزية العشرة الأعلى تصنيفاً حسب QS. وظفت نمذجة المعادلات البنائية لاختبار فرضيات الدراسة باستخدام IBM AMOS. أظهرت نتائج الدراسة أن مكونات الحضور الاجتماعي (بناء العلاقات، الثقة، التماسك، والتواصل) والقيادة الافتراضية لها أثر ذو دلالة إحصائية على أداء الفرق الافتراضية. وقد وجد أيضاً أن مشاركة المعرفة تقوم بدور الوسيط في العلاقة بين الحضور الاجتماعي وأداء الفرق الافتراضية، على عكس العلاقة بين القيادة الافتراضية وأداء الفرق الافتراضية. أظهرت نتائج الدراسة أن ثراء الوسائط لم تقم بدور المعدل في العلاقة بين الحضور الاجتماعي والقيادة الافتراضية وبين أداء الفرق الافتراضية. تعد الدراسة الحالية مساهمة معرفية أصيلة في الأدبيات السابقة التي تناولت أداء الفرق الافتراضية. ففي السياق النظري، إن الدراسة الحالية مساهمة مهمة إذ تم اختبار علاقات جديدة لم تتناولها الدراسات السابقة، مثل الدور الوسيط لتبادل المعرفة، والدور المعدل للثراء الإعلامي. في السياق القطاعي تعد الدراسة الحالية دراسة حديثة في ماليزيا تبحث في أداء الفرق الافتراضية في قطاع التعليم العالي الماليزي من وجهة نظر إدارية. وفي السياق المنهجي، تضيف الدراسة الحالية إضافة مهمة حيث يكون مجتمع الدراسة هم الموظفين الإداريين في قطاع التعليم العالي، لذا فقد تم تناول أداء الفرق الافتراضية من وجهة نظر إدارية، بينما ركزت الدراسات السابقة على مجتمع الدراسة المكون من الطلاب حيث تناولت أداء الفرق الافتراضية من وجهة نظر تربوية.

ABSTRACT

Virtual teams have been used in workplaces in recent years, replacing traditional teams. Therefore, researchers have been interested in how to improve the performance of virtual teams. The main research problem is to re-evaluate the factors influencing the performance of virtual teams in the Malaysian higher education sector to support the creation of effective virtual teams that contribute to the success and survival of institutions. This study aims to **investigate** the role of the components of social presence (relationship building, trust, cohesion, and communication) and virtual leadership in enhancing the performance of virtual work teams in the higher education sector in Malaysia. Moreover, the study aims to **examine** the mediating role of knowledge sharing and the moderating role of media richness in previous relationships. The research **employed** a quantitative **research** methodology. A survey was conducted using a questionnaire where data was obtained from 373 administrative employees from the Top-Ten Malaysian Universities according to **Quacquarelli Symonds (QS) World University Rankings**. Structural Equation Modelling (SEM) was employed to test the hypotheses using (IBM AMOS). Findings show that the components of social presence (relationships building, trust, cohesion, and communication) and virtual leadership have a statistically significant impact on the performance of virtual teams. In addition, it was found that knowledge sharing plays a mediating role in the relationship between social presence and the performance of virtual teams, while it does not play a mediating role in the relationship between virtual leadership and the performance of virtual teams. Moreover, it is concluded that media richness did not play a moderating role in the relationship between social presence, virtual leadership and the performance of virtual teams. **Thus, the** study **contributed** an original contribution to the literature review on the performance of virtual teams. In the theoretical context, this study makes a significant contribution by exploring previously **inadequately** examined relationships, such as the mediating role of knowledge sharing and the moderating role of media richness. Sectorally, it stands out as a recent research conducted in Malaysia to evaluate the performance of virtual teams within the higher education sector from an administrative perspective. Methodologically, the study is noteworthy for its focus on administrative employees in the higher education sector, thereby addressing the performance of virtual teams from an administrative standpoint. This contrasts with prior research, which predominantly concentrated on students and examined virtual team performance from an educational perspective.

Both abstracts are revised and copyedited

Bachar Bakour

Associate Professor,

(Islamic Thought and Civilization)

Department of Fundamental and Interdisciplinary Studies (FIDS),
Kulliyah of Islamic Revealed Knowledge and Human Sciences (KIRKHS),
International Islamic University Malaysia (IIUM),
bashar@iium.edu.my

29/10/24

