

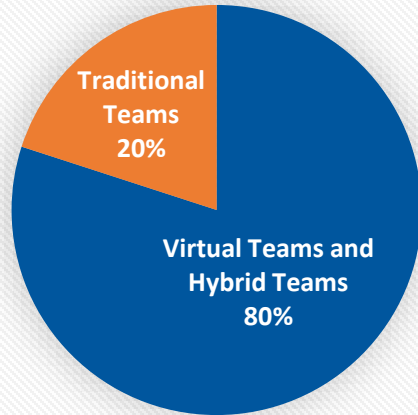
Trust, Technological Competency and Performance of Virtual Project Teams in the New Normal

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Supervisor: Prof. Bon-Gang Hwang

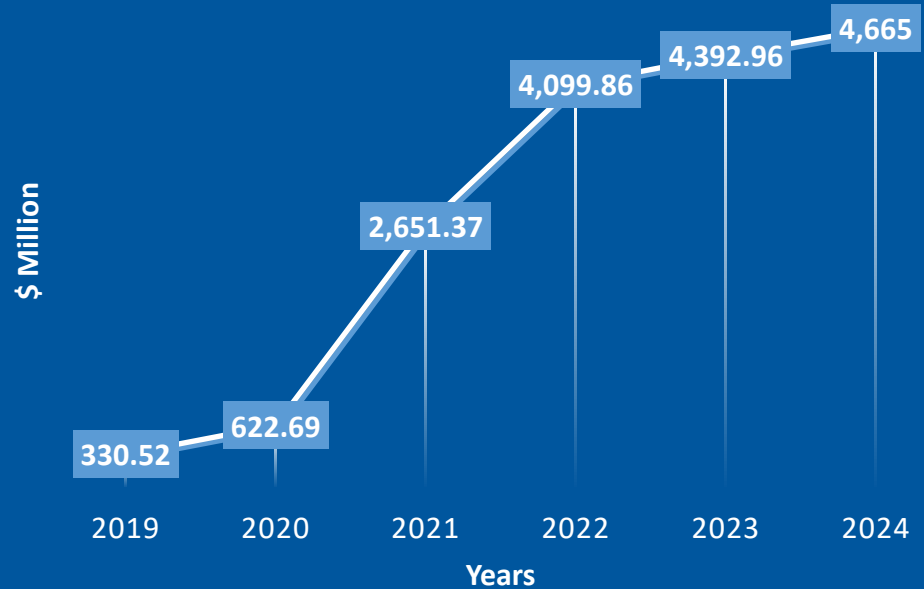
Motivation

Global Organizations Collaboration
Models



64% of organizations say that the shift to virtual team will be permanent (Meluso et al., 2020)

ZOOM REVENUE TRENDS



Motivation

- ❑ Businesses in the new normal are turning to **virtual teams**
- ❑ One of the critical factors influencing the team performance is **trust**, which is more challenging in virtual teams
- ❑ More difficulties in building trust when consider the **project nature** of the built environment industry
- ❑ There is a digital divide among multiple stakeholders with low **technological competency** in the built environment industry

Research Gaps

- ❑ Lack of understanding of **trust building** in virtual project teams, especially in the built environment industry
- ❑ Lack of research on **relationship** between trust, technological competency and performance in virtual project teams
- ❑ Lack of **an integrated system** for assessing and improving technological competency and trust of virtual project teams

Objectives



**Identify Significant Factors
affecting trust building in
virtual project teams (VPTs)**

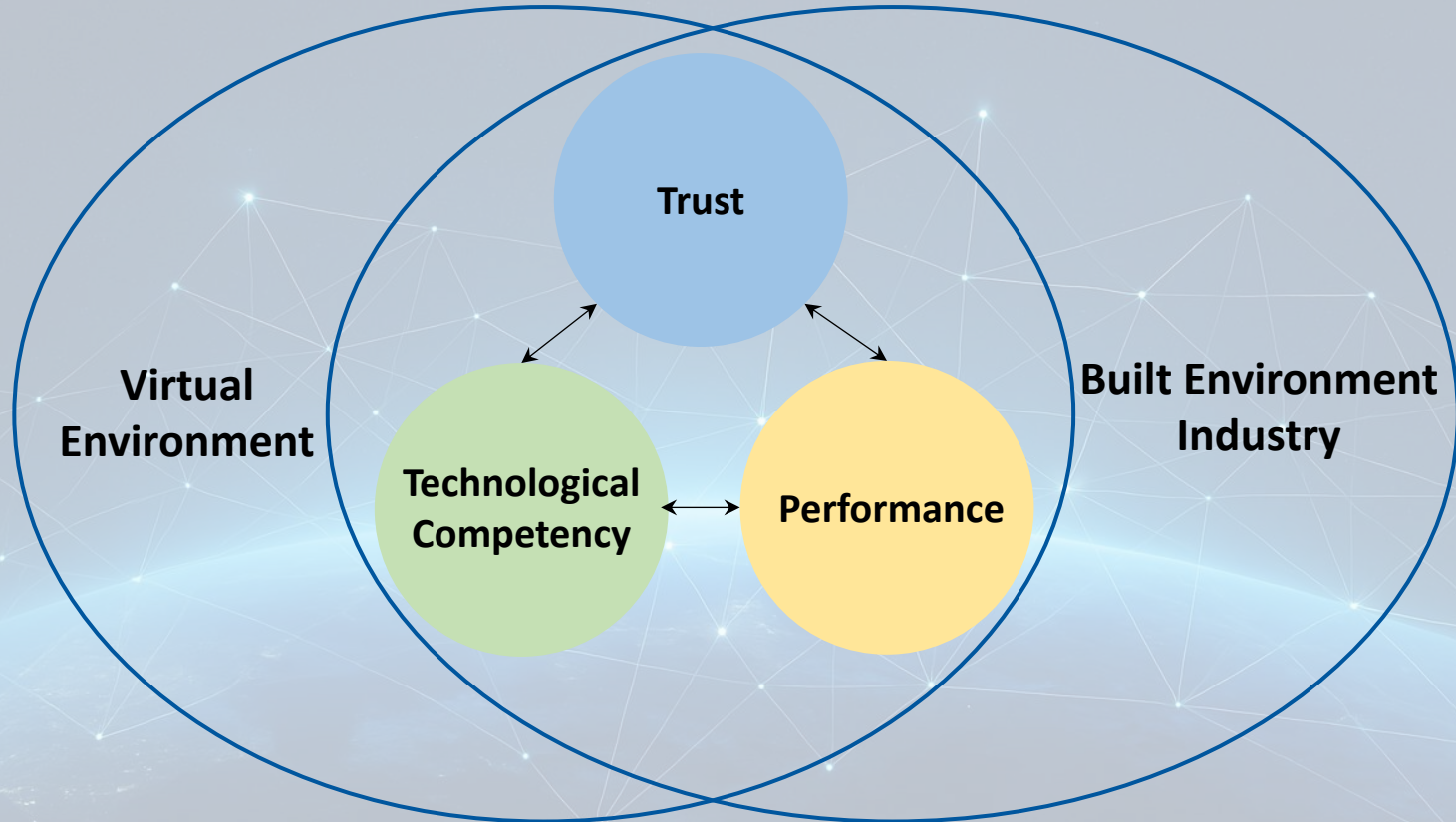


**Develop Theoretical
Frameworks linking trust,
technological competency
and performance**



**Develop a Trust and
Technological Competency
Analytics and Innovations
System**

Research Scope



Research Approach

Research objectives

Research approach

Research Objective 1:
Identify significant factors that affect trust building in virtual project teams within the built environment industry and their interdependencies.

Task 1: Identify mainstream research topics and research gaps in building trust in virtual project teams.

- Literature review
- Bibliometric analysis

Task 2: Identify the influencing factors of trust and technological competency in virtual project teams.

- Literature review
- Bibliometric analysis

Task 3: Design and validate the survey questionnaire.

- Expert panel interviews

Task 4: Assess the significant factors that influence trust and technological competency in virtual project teams in the built environment industry.

- Questionnaire surveys
- Nonparametric analysis

Research Objective 2:
Develop a theoretical framework for trust building with technological competency and the subsequent impact on virtual project team performance for the built environment industry.

Task 8: Validate the theoretical framework and proposed strategies and recommendations to improve trust and technological competency in virtual project teams.

- Expert panel interviews
- Framework coding

Task 7: Identify effective strategies and recommendations that can be undertaken by virtual project teams to improve trust and technological competency among the team members.

- Literature review

Task 6: Develop the theoretical framework of trust building and subsequent impact on virtual project team performance for the built environment industry.

- Partial Least Squares - Structural Equation Modeling

Task 5: Assess the levels of trust, technological competency and project team performance in virtual project teams.

- Questionnaire surveys
- Nonparametric analysis

Research Objective 3:
Develop a Trust and Technological Competency Analytics and Innovation System (TTCAIS) to assess the levels of technological competency and trust and propose recommendations that can be undertaken to improve trust and technological competency in virtual project teams.

Task 9: Determine the weights of assessment factors of trust and technological competency in virtual project teams.

- Entropy weighting method

Task 10: Develop a Trust and technological competency Analytics and Innovations System (TTAIS) that can assess the level of trust and technological competency and provide tailored improvement recommendations.

- System development

Task 11: Validate the TTAIS through test-implementations and interviews.

- Test-implementations
- Expert panel interviews

Task 12: Launch TTAIS.

Factors Identification

Objective 1

Trust Influencing Factors



Individual-Related Factors

Reliability
Benevolence
Empathy

.....



Project Team-Related Factors

Team's Knowledge Sharing
Power of Team
Shared Values

.....



Organization-Related Factors

Organizational Culture
Organizational Structure
Support of Senior Management

.....

Technological Competency



Knowledge

Project Integration Management
Project Scope Management
Knowledge in Virtual Teams
.....



Skills

Communication
Information Management
Team Building
.....



Personal Attributes

Personal Characteristics
Attitude towards Technology

Three-Level Trust Influencing Factors

Individual-related Factors

- Reliability
- Competence
- Responsibility
- Affect
- Conflicting identities
- Initiative
- Reputation
- Integrity
- Following rules
- Benevolence
- Intuitive
- Consistency
- Empathy
- Cultural awareness
- Commitment

Project Team-related Factors

- Team's knowledge sharing
- Leadership of teams
- Teams' information communication technology
- Teams' communication
- Shared values
- Collocation environment
- Power of team
- Team processes and structure
- Team composition differences
- Task interdependence
- Perceived trustworthiness of team
- Team's monitor behaviors

Organization-related Factors

- Organizational culture
- The support of senior management
- Organizational knowledge sharing
- Organizational experiences and resources
- Organizational structure
- Human resource policies and procedures
- The organization's IT infrastructure
- Organizational training
- Selection of team leaders
- Organizational citizenship behaviour
- Organizational monitoring behaviour

Technological Competency

Knowledge

- Project integration management
- Project scope management
- Project schedule management
- Project cost management
- Project quality management
- Project resource management
- Project communication management
- Project risk management
- Project procurement management
- Project stakeholder management
- Knowledge in virtual teams

Skills

- Technical and operational technology skills
- Project management
- Information management
- Planning and organizing
- Communication
- Social and cultural awareness
- Organizational awareness
- Creativity
- Problem solving
- Ethical awareness
- Strategic planning skills
- Active learning
- Conflict management
- Decision making
- Delegation
- Motivation
- Negotiation
- Team building

Personal Attributes

Personal Characteristics

- Achievement orientation
- Information seeking
- Impact and influence
- Teamwork
- Analytical thinking
- Self-control
- Initiative
- Focus on client's needs
- Directiveness/ assertiveness
- Team leadership
- Conceptual thinking
- Flexibility

Attitude towards Technology

- Perceived usefulness
- Perceived ease of use
- Technology self-efficacy
- Technology affect
- Technology anxiety
- Personal innovativeness in IT

Trust Building Framework with Technological Competency

Top Factors Influencing Trust in VPTs

Organization-Related Factors

- The organization's IT infrastructure
- Organizational monitoring behaviour
- Organizational training

Project Team-Related Factors

- Teams' communication
- Teams' information communication technology
- Team's knowledge sharing

Individual-Related Factors

- Commitment
- Following rules
- Consistency

Top Factors of Technological Competency in VPTs

Knowledge

- Project communication management
- Knowledge in virtual teams
- Project cost management

Skills

- Motivation
- Planning and organizing
- Negotiation

Personal Characteristics

- Flexibility
- Conceptual thinking
- Team leadership

Differences

Team Differences

Respondent Differences

Organization Differences



Virtual Project Teams

VS



Traditional Face-to-Face
Project Teams

**More Significantly Important Factors
Compared to Traditional Project Teams**

The organization's IT infrastructure

Knowledge in virtual teams

Designation

Age

Gender

Education

**Years of
Experience**



Type

Size



Factors with Differences

Knowledge in virtual teams

Organizational knowledge sharing

Framework Development

Objective 2



Assessment Factors

Differences



VS



Trust



Technological
Competency



Performance



Performance

Significance in the
Level of VPTs

Scope Management

+

Change Management

+

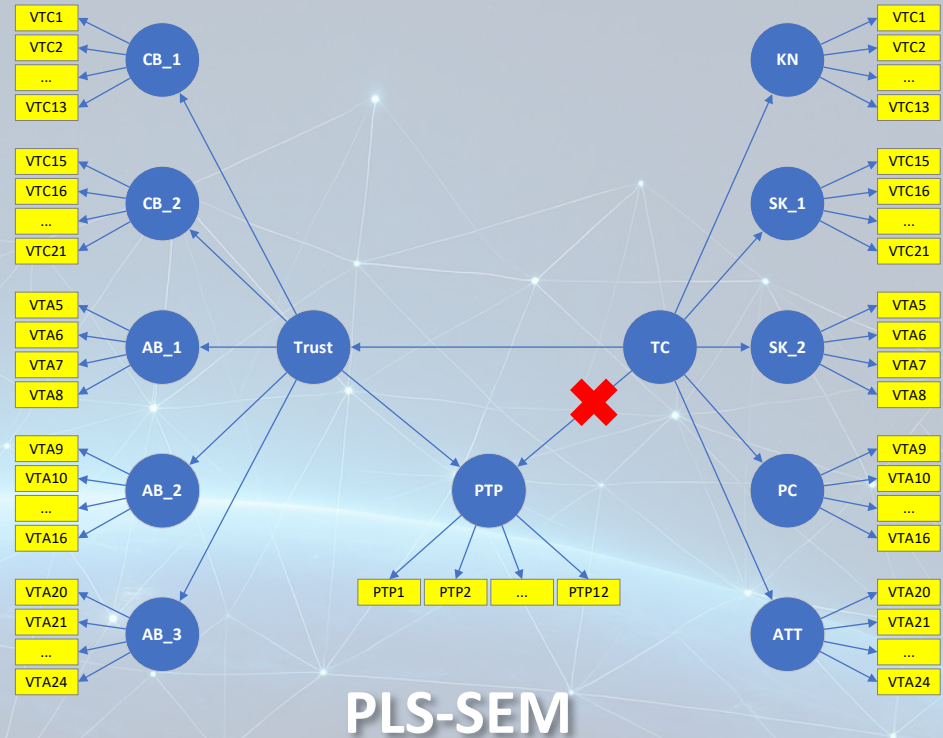
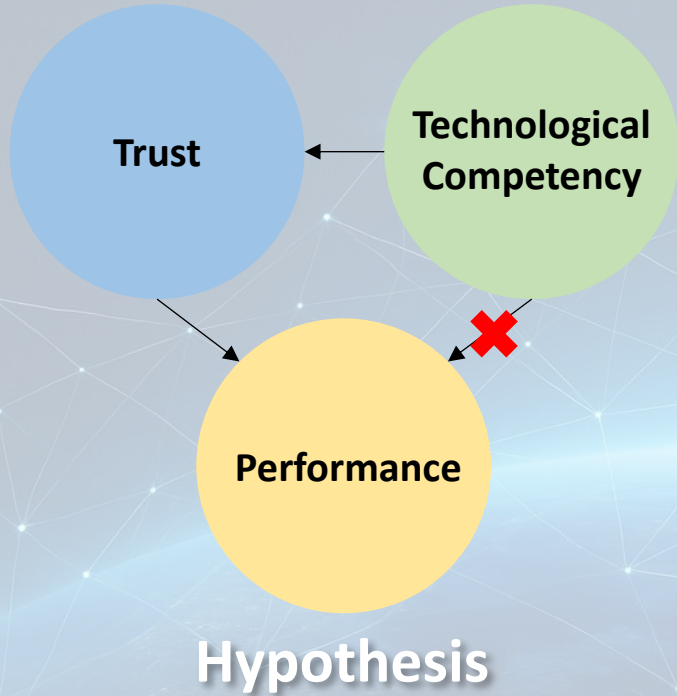
Resource Allocation Efficiency

+

Conflict Resolution

+

Relationship



Technological Competency

Knowledge

- Project integration management
- Project scope management
- Project schedule management
- Project cost management
- Project quality management
- Project resource management
- Project communication management
- Project risk management
- Project procurement management
- Project stakeholder management
- Knowledge in virtual teams

Skills

- Technical and operational technology skills
- Project management
- Information management
- Communication
- Social and cultural awareness
- Organizational awareness
- Creativity
- Problem solving
- Ethical awareness
- Strategic planning skills
- Active learning
- Conflict management
- Decision making
- Delegation
- Motivation
- Negotiation
- Team building

Personal Attributes

Personal Characteristics

- Achievement orientation
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Attitude toward Technology

- Perceived usefulness
- Perceived ease of use
- Technology self-efficacy
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Trust

Cognition-Based Trust

- Integrity
- Competence
- Commitment
- Credibility
- Reliability
- Dependability
- Consistency

Affect-Based Trust

- Intuitive
- Relation
- Faith in intentions
- Motives
- Good moral
- Goodwill
- Responsiveness

Project Team Performance

- Schedule adherence
- Budget adherence
- Quality of deliverables
- Safety management
- Risk management
- Stakeholder satisfaction
- Scope management
- Team cohesion
- Communication effectiveness

Competency-Driven Trust and Performance Framework

System Development

Objective 3

System Development

Trust and Technological Competency Analytics and Innovations System (TTCAIS)



Knowledge-based
Expert System

INTRODUCTION

Trust and Technological Competency Analytics and Innovations System

A tool designed for members working in virtual project teams to evaluate trust and technological competency levels.

Get Started

□ Purpose

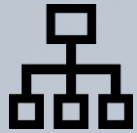
- **Assess** the level of trust and technological competency
- **Propose** Improvement recommendations

□ Benefits

- Provide users' organizations and project teams with **data-driven insights** to enhance collaboration and performance in virtual environments

System Development

Component



Assessment Framework



Decision Support System (DSS)

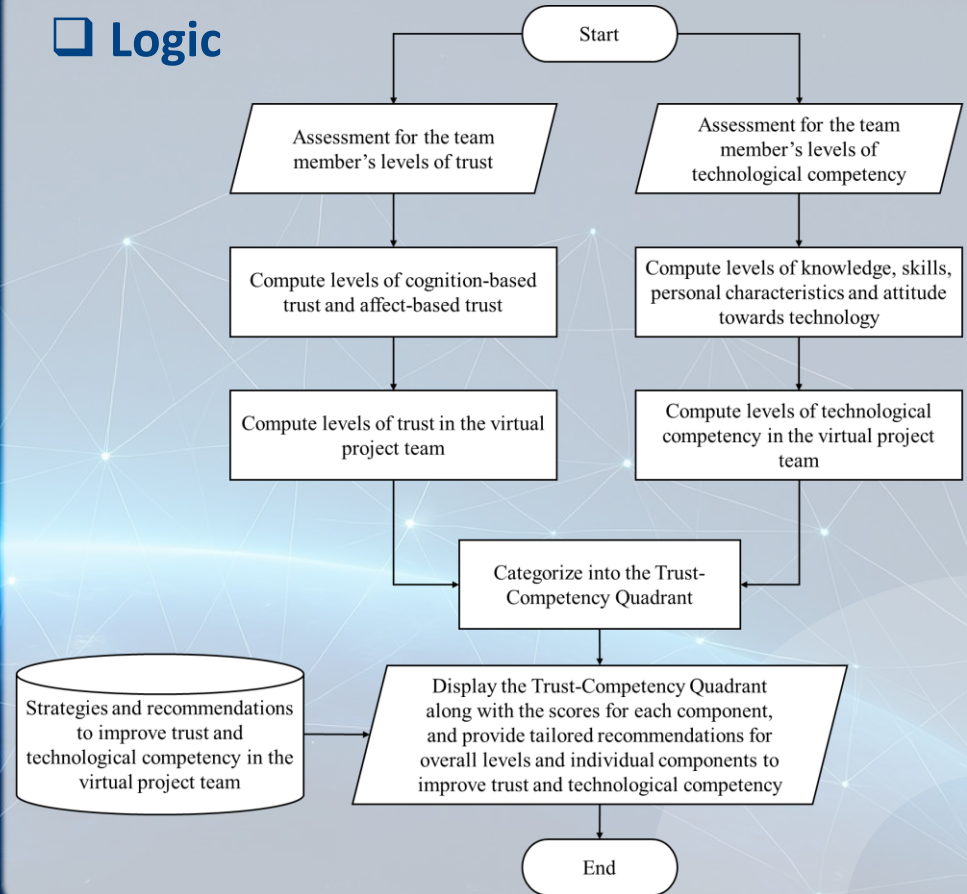


Graphical User Interface (GUI)



Knowledge-Based System (KBS)

Logic



System Development



Knowledge-based
Expert System

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INTRODUCTION

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[Get Started](#)



Introduction

Trust and Technological Competency Analytics and Innovations System is a tool designed for members working in virtual project teams. This system evaluates the levels of trust and technological competency within project teams and provides tailored action plans to enhance these critical factors in virtual collaboration.

Background

With the development of smart technologies and the rise of digital transformation, AI-driven collaboration and flexible work arrangements, the built environment industry is undergoing a major transformation. Organizations are increasingly adopting hybrid and remote work models, making the success of virtual

System Development

Trust and Technological Competency Analytics and Innovations System

Empowering Virtual Project Teams to Succeed

Overall Progress

0%

Cognition-Based Trust

Please rate the agreement of the following descriptions about the level of trust you give to virtual project teams you have been involved in.

(1 = completely disagree, 7 = strongly agree)

0%

I think my team members demonstrate honesty in our interactions.

1

Strongly Disagree

2

3

4

Neutral

5

6

7

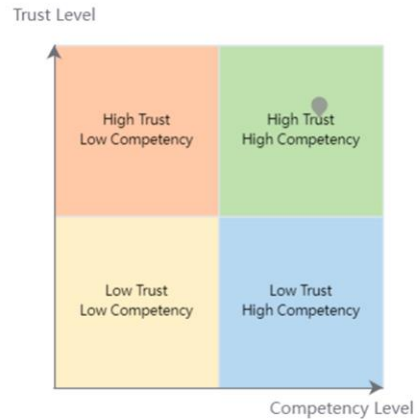
Strongly Agree

System Development

Overall Trust and Competency Level

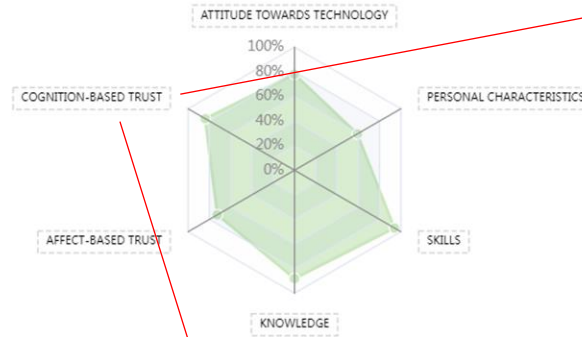
High Trust - High Competency

Trust score Competency score
77.96% 80.71%



What Can You Do to Improve?

Scoring of Trust and Competency Components



Key Sub-Factors to Focus On

I think my team members adhere to ethical principles.

42.86% Q3

I think my team members demonstrate honesty in our interactions.

57.14% Q2

I think my team members keep their promises.

71.43% Q2

Recommendations for Cognition-Based Trust

- Conduct regular retrospectives to help members analyze their behaviors and their impact on trust.
- Implement dynamic role rotation to enhance awareness of others' capabilities.
- Encourage members to document and share their perceptions of others' behavioral patterns to enhance mutual understanding and trust.
- Establish a mentorship system where experienced members guide others in trust development.
- Provide cross-cultural training to expand members' cognitive schemas and better understand diverse behaviors.

System Development

Overall Recommendations

- Strengthen peer-learning programs where experienced team members act as mentors, supporting the continuous development of both trust and competency.
- Leverage AI-driven project management, predictive analytics, and automation tools to further enhance decision-making efficiency.
- Maintain transparent feedback mechanisms, such as periodic team reflections and competency assessments, to ensure continuous growth.
- Engage with external experts, industry leaders, or academic institutions to keep the team at the forefront of digital competency and trust-building methodologies.
- Standardize best practices in a shared knowledge repository and develop structured onboarding processes for new members to sustain high performance.



I think my team members demonstrate honesty in our interactions.



Neutral

System Development



Knowledge-based
Expert System

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INTRODUCTION

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Introduction

Trust and Technological Competency Analytics and Innovations System is a tool designed for members working in virtual project teams. This system evaluates the levels of trust and technological competency within project teams and provides tailored action plans to enhance these critical factors in virtual collaboration.

Background

Contribution and Recommendation

Knowledge and Practices

Contributions



Contributions to Knowledge

- ❑ Extends trust building models in VPTs
- ❑ Investigates the interrelationship
- ❑ Addresses unique challenges

Contributions to Practices

- ❑ Provides a practical tool
- ❑ Supports training to reduce digital divide
- ❑ Offers strategies for building trust
- ❑ The findings can be extended to other sectors

Recommendations to the Industry

Strength Trust in VPTs



- ❑ Invest in **robust IT infrastructure** to support seamless collaboration
- ❑ Establish **transparent monitoring and communication mechanisms**
- ❑ Promote **knowledge sharing platforms** to enhance team reliability

Enhance Technological Competency in VPTs



- ❑ Provide training on **virtual project management, cost control, and collaboration tools**
- ❑ Develop **motivation, planning, organizing, and negotiation skills** among team members
- ❑ Foster **digital leadership** to guide teams through technological transitions

Leverage TTCAIS for Continuous Improvement



- ❑ Assess **trust and competency levels** using TTCAIS
- ❑ Receive **tailored improvement recommendations** for targeted trust and competency building
- ❑ Use the **knowledge base** to adopt best practices and accelerate digital transformation



THANK YOU