FACTORS AFFECTING THE ACCEPTANCE OF HYPER-CONVERGED INFRASTRUCTURE (HCI) TECHNOLOGY USAGE BY IT STAFF IN PUBLIC HOSPITALS WITHIN THE BANGKOK METROPOLITAN AREA

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The Graduate School of Thai-Nichi Institute of Technology has been approved and accepted as partial fulfillment of the requirement for the Master's Degree

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KORAPAT TEEKAMONGKOL: FACTORS AFFECTING THE ACCEPTANCE OF HYPER-CONVERGED INFRASTRUCTURE (HCI) TECHNOLOGY USAGE BY IT STAFF IN PUBLIC HOSPITALS WITHIN THE BANGKOK METROPOLITAN AREA. ADVISOR: Dr. WANNAPOL SUPHASKULDAMRONG, 31 PP.

This study investigates the factors influencing the acceptance of Hyper-Converged Infrastructure (HCI) technology among IT professionals in Bangkok public hospitals. Grounded in the Technology Acceptance Model (TAM), the research aims to determine how personal factors, Perceived Usefulness (PU), and Perceived Ease of Use (PEOU) affect user attitude and actual intention to deploy the technology.

A quantitative cross-sectional survey was utilized, successfully collecting data from 403 IT staff members. The gathered data was analyzed using One-Way ANOVA and Multiple Regression Analysis (MRA) to test the predictive relationships between the core constructs and identify the primary drivers of technology adoption.

The findings fully supported all hypotheses. While both PU and PEOU positively influenced user attitude, PEOU emerged as the significantly stronger driver. Additionally, age significantly altered acceptance levels, highlighting distinct generational differences. Notably, despite holding a highly positive attitude toward HCI, the staff's actual intention to deploy remained neutral, revealing a significant "Adoption Gap". Hospital administrators are recommended to prioritize ease-of-use training, tailor implementation strategies by age bracket, and provide explicit policy support to convert positive attitudes into actual technology adoption.

Graduate School Student's Signature……

Field of Study innovation of Business Advisor's Signature……

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This independent study, “Factors Influencing IT Staff Acceptance of Hyper-Converged Infrastructure (HCI) in Bangkok Public Hospitals,” could not have been successfully completed without the invaluable support, guidance, and encouragement of several individuals and organizations.

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Their willingness to dedicate their valuable time to participate in the survey and provide the 403 valid responses made the empirical analysis of this research possible.

Finally, I am profoundly grateful to my family, friends, and colleagues for their unwavering moral support, understanding, and encouragement throughout my academic journey.

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Chapter 1
Introduction

1.1 Statements and Significance of the Problem

In this modern age of technology have come in and have significant roles in work along with influencing the way of life, majority of the organization have adapted and used technology on all fronts of their operations but the major differences is their investment in the technologies such as equipment, hardware, software and networking including human resource development to support the organization need to organize their databases. Browsing databases via internet, receiving information through computer networks along using these technologies have made technology essential in all organizations to both private and public sectors. About how organizations will benefit from the technology is about how they are ready to accept it and the mindset of the user in the organization (Onsri, 2010).

Public hospitals, as service-sector agencies providing healthcare services, can also utilize information technology in their operations to serve both patients and staff, in order to enhance the hospital's capabilities, the use of information technology involves using server computation to collect and process data, which assists in hospital administration as well as medical treatment. Currently, the Bangkok metropolitan area hosts numerous public hospitals, including 11 major hospitals under the Bangkok Metropolitan Administration (BMA) and several large medical centers under the Ministry of Public Health (MOPH). Due to the large number of patients receiving services daily, large amount of medical documentation and data is generated. Furthermore, patient historical data are crucial for treatment as it supportingsupports clinical decision-making and displays results to guide care. The various information systems that help manage this data are therefore an essential component. Consequently, information technology should be used to support and improve the efficiency of medical personnel (Kulachat Yongyuenarn, 2022). Therefore, there must be system study and analyze, along with planning for technology implementation, to ensure the hospital's systems can be continuously developed to meet quality standards.

Hyper-Converged Infrastructure (HCI) server technology is considered a significant technological evolution in organizational IT that has gained continuous popularity. It is an infrastructure technology that combines various core components, such as compute, data storage, network connectivity, and management capabilities. It integrates multiple core components of data center operations into a single, unified system for management to increase scalability, reduce complexity, and improve efficiency. The primary benefit of HCI technology is that it simplifies the management of data collection, storage, and processing, helping to reduce the complexity often found in separate systems.

This is because users have less to coordinate and upgrades are easier. System administration tasks thus become more agile. While exact adoption numbers vary, an increasing number of these public hospitals are currently initiating transitions to HCI programs to modernize their Hospital Information Systems (HIS).

However, in practice, public hospitals have encountered significant IT problems that led to the conduct of this study. Hospitals frequently face system downtimes, delayed data retrieval, and highly complex troubleshooting processes caused by aging, separate legacy architectures (3-Tier). Yet, when hospital administrators attempt to implement HCI to solve these issues, a significant human-factor problem arises: the behavioral intention and adoption readiness of the hospital personnel. There is often resistance to using the new architecture or an unwillingness to accept change due to a lack of confidence, fear of operational disruption, or reluctance to abandon familiar legacy systems.

Furthermore, organizations can start with the resources they need and expand by simply adding more nodes, adhering to a “pay-as-you-grow” model, which helps reduce the risk of excessive costs from over-provisioning or resource underutilization. Moreover, the consolidation of resources helps reduce both capital and operational expenditure, and improves performance (Sangfor, 2024).

However, because hospitals that have introduced technology into their medical and healthcare processes may find it beneficial for patients and internal hospital staff, there’s significant problem is the acceptance and adoption of this technology within the context of hospital personnel. Sometimes, there may be resistance to using the architechure or unwillingness to accept change due to a lack of confidence in using new

technology or a fear that the change might affect work performance or organizational management. This could affect the quality of medical and health services, directly affecting patients and staff, as well as causing losses for the organization that invested in technology but cannot utilize it effectively (Rachi Paluecha, 2022).

For the organization or hospital administrators to make decisions on approaches that will impact various factors and help users within the organization accept the information system, the Technology Acceptance Model (TAM) concept has been adopted. This model is used to predict user acceptance of information technology. Davis (1985) integrated the model's basic concepts with the Theory of Reasoned Action to create a model for explaining the behavior of information technology users. The relationship between each component is that Perceived Usefulness and Perceived Ease of Use will affect the Attitude toward Using, which in turn leads to Behavioral Intention, and ultimately results in Actual Use of the technology (Pramote Lue-nam, 2011).

From the foregoing, the researcher is interested in studying the factors affecting the acceptance of Hyper-Converged Infrastructure (HCI) technology usage by IT staff in public hospitals within the Bangkok metropolitan area. The results of this study can be used to develop and promote the effective implementation of new technologies in the public sector. Furthermore, agencies can appropriately plan internal communication within the organization to enhance the efficiency of information technology use in the future. This study is necessary because there is limited research on HCI adoption in public hospitals in Bangkok, particularly among IT staff. Identifying the specific factors influencing acceptance in this context can help bridge the research gap and support more effective implementation strategies.

1.2 Objectives

1. To compare the effects of demographic factors on the behavioral intention to use HCI.
2. To examine the effect of perceived usefulness and perceived ease of use on the attitude toward using HCI.
3. To examine the effect of attitude toward using HCI on the behavioral intention to use HCI.

1.2.1 Independent Variables:

1) Personal factors: Gender, age, educational level, work experience.

2) Factors affecting technology acceptance: Perceived usefulness, perceived ease of use, and attitude toward use.

1.2.2 Dependent Variable

Technology acceptance for implementation of HCI Platform

1.2.3 Time Scope and Limitation of the Study.

1) This research will be conducted from October 2025 to December 2025.

2) Scope of Population: The target group consists of specialized IT operations and infrastructure personnel (System Administrators, Network/Storage Engineers, etc.).

3) Scope of Area: Public hospitals in the Bangkok metropolitan area under the Ministry of Public Health (MOPH) and the Bangkok Metropolitan Administration (BMA).

4) Limitation of the Study: In evaluating demographic impacts on technology adoption, this study focuses specifically on Age as the primary comparative factor, as it was identified as the key differentiator influencing behavioral intention among the surveyed IT professionals.

1.3 Conceptual Framework

In this research, the researcher studied concepts, theories, and reviewed literature related to HCI., including the concept of Davis (1989): the application of the Technology Acceptance Model (TAM). This model explains user behavior based on various factors that influence technology acceptance, including: The Technology Acceptance Model (TAM) was used as the framework for this study, incorporating factors that may influence technology acceptance, including: the Perceived usefulness factor, the Perceived ease of use factor, the Attitude toward [using] factor, and the Behavioral intention to actual use factor. This can be presented as the conceptual framework for the research, as shown in Figure 1.

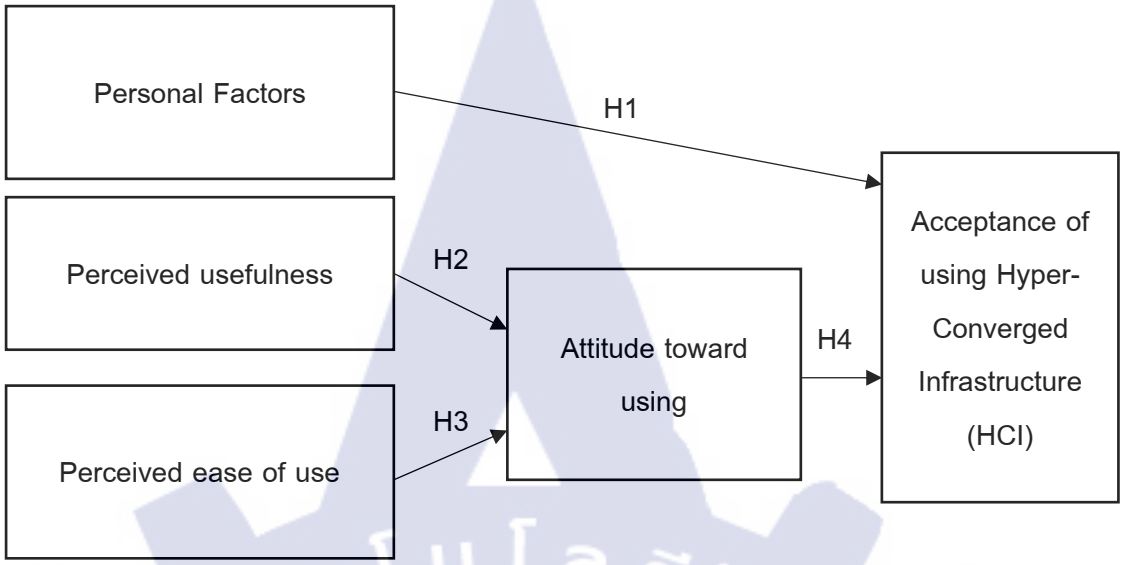

Figure 1 Conceptual Framework

1.4 Hypotheses

From the conceptual framework mentioned above regarding the study of factors affecting the acceptance of Hyper-Converged Infrastructure (HCI) technology usage by IT staff in public hospitals in the Bangkok metropolitan area, the researcher has established the following hypotheses to test the relationships between the various factors affecting technology acceptance:

Hypothesis 1: Different personal factors have different positive effects on the acceptance of Hyper-Converged Infrastructure (HCI) technology usage. **Hypothesis 2:** Perceived usefulness affects the attitude toward use. **Hypothesis 3:** Perceived ease of use affects the attitude toward use. **Hypothesis 4:** Attitude toward use affects the acceptance of Hyper-Converged Infrastructure (HCI) technology usage.

1.5 Definitions of Specific Terms

Hyper-Converged Infrastructure (HCI) Technology: Refers to an information technology infrastructure system that combines various core computing components, such as compute, data storage, network connectivity, and management capabilities, to increase scalability, reduce complexity, and improve efficiency.

IT Staff in Public Hospitals: The specialized personnel responsible for managing, securing, and maintaining the hospital's infrastructure and network systems.

Age: The chronological age bracket of the IT staff, acting as the primary demographic factor analyzed for its effect on technology adoption. Perceived Usefulness (PU): The degree to which the IT staff believes that utilizing HCI will enhance their job performance and hospital IT operations.

Perceived Ease of Use (PEOU): The degree to which the IT staff believes that managing and operating the HCI platform will be free of mental and physical effort.

Attitude Toward Using (ATU): The overall positive or negative feeling the IT staff holds regarding the transition to and daily use of HCI.

Behavioral Intention (BI): The degree to which an IT staff member has formulated a conscious plan to perform or adopt the actual usage of HCI technology in their hospital.

1.6 Expected Benefits

The researcher expects that this research will get the following benefits:

1.6.1 To understand the factors influencing behavioral intention to use of Hyper-Converged Infrastructure (HCI) technology usage by users in public hospitals within the Bangkok metropolitan area.

1.6.2 To enable the research results to be used in developing and promoting hospital personnel through more effective training in the use of HCI information technology.

1.6.3 To enable public hospital administrators to use the research results as a guideline for internal organizational management and for shaping user attitudes, ensuring that the technology is utilized in operations.

1.6.4 To allow academics to use the research results to study and expand upon the factors influencing behavioral intention in other contexts.

Chapter 2
Literature Review

2.1 Introduction and Chapter Overview

This chapter provides the theoretical and empirical foundation for understanding why IT professionals in Bangkok's public hospitals choose to adopt or resist **Hyper-Converged Infrastructure (HCI)**. By reviewing technical concepts, established acceptance models, and the current digital landscape in Thailand, this section bridges the gap between technical infrastructure and human behavior.

2.2 Hyper-Converged Infrastructure (HCI): More than Just Servers

2.2.1 The Technical Shift

HCI represents a move away from traditional "three-tier" hardware. It is a **software-defined architecture** that bundles compute, storage, and networking into one unified system. Instead of managing separate boxes, staff use a "single-pane-of-glass" interface to control everything.

2.2.2 Real-World Benefits

For hospitals, the primary draw is the "pay-as-you-grow" model, which prevents over-spending on hardware. It also simplifies disaster recovery—a critical need in environments where patient data must be available 24/7.

2.2.3 Local Success Stories

In Thailand, **Nong Khai Hospital** and **Wanon Niwat Hospital** have already transitioned to HCI to support their **Hospital Information Systems (HIS)**. These facilities reported faster backups and more responsive systems after moving away from older architectures.

2.3 Understanding User Acceptance: Theoretical Frameworks

The success of a new technology is not just about its features; it is about the **mindset of the users**.

2.3.1 The Technology Acceptance Model (TAM): This study relies heavily on TAM, which suggests that if a staff member believes a system is useful (PU) and easy to use (PEOU), they will develop a positive attitude (ATU) toward it. This attitude ultimately leads to their intention to actually use the technology in their daily work.

2.3.2 The Human Factor (UTAUT): While TAM focuses on beliefs, the Unified Theory of Acceptance and Use of Technology (UTAUT) adds that personal differences—such as age, gender, and work experience—act as moderators. For example, a veteran IT staff member might perceive a new system differently than a recent graduate.

2.3.3 The Big Picture (TOE): The Technology-Organization-Environment framework reminds us that hospital adoption is also driven by external pressures, such as government mandates and organizational readiness.

2.4 The Thai Digital Health Landscape

Modernization in Bangkok's public sector is no longer optional. National initiatives like the **MOPH Cloud** (serving over 400 facilities) and the **Digital Health Act of November 2025** are pushing hospitals to unify their data systems. These policies create an environment where adopting agile infrastructure like HCI becomes a strategic necessity rather than a luxury.

2.5 Defining the Core Concepts

To ensure clarity, this study defines its key variables as follows:

2.5.1 Perceived Usefulness (PU): How much the IT staff believes HCI improves hospital efficiency and data management.

2.5.2 Perceived Ease of Use (PEOU): The degree to which the system feels straightforward and reduces the complexity of management.

2.5.3 Attitude toward Using (ATU): The positive or negative feelings staff have about switching to HCI.

2.5.4 Personal Factors: The specific traits of the staff, including educational level and years of experience, which may influence their willingness to change.

2.6 Synthesis: Linking Theory to Practice

This review confirms that while HCI offers technical agility, human resistance remains a significant hurdle. By testing the relationships between **PU, PEOU, and ATU**, this study aims to provide hospital administrators with a roadmap for smoother technology implementations.

2.7 Analogy for Understanding HCI Acceptance

Think of moving to HCI like a traditional chef switching to a **smart, integrated kitchen suite**.

2.7.1 HCI is the smart kitchen where the oven, stove, and fridge are all controlled by one digital screen instead of separate dials.

2.7.2 Perceived Usefulness is the chef realizing the kitchen helps them cook faster for a crowded restaurant (PU).

2.7.3 Perceived Ease of Use is the chef finding the digital screen simple to navigate (PEOU).

2.7.4 Personal Factors are the chef's age or years of experience using old-fashioned stoves, which might make them more or less excited to try the new technology.

2.8 Review of the Literature / Related Studies

Numerous related studies support the framework of this research. Davis (1989) established the foundational evidence that perceived usefulness and perceived ease of use are critical determinants of technology adoption. In the healthcare context, Aggelidis and Chatzoglou (2009) demonstrated that TAM constructs effectively predict hospital information system adoption among medical personnel. Holden and Karsh (2010) further validated that cognitive beliefs significantly predict user attitudes and subsequent behavioral intentions in clinical settings. Furthermore, Venkatesh et al. (2012) highlighted that demographic variables, particularly age, moderate the impact

of performance and effort expectancies on behavioral intentions, validating the inclusion of demographic factors in this study's framework.

Chapter 3
Research Methodology

3.1 Research Design and Approach

This study employs a quantitative, cross-sectional survey design to empirically test the factors influencing the acceptance of Hyper-Converged Infrastructure (HCI) among IT professionals. Instead of complex modeling, this study utilizes Multiple Regression Analysis (MRA) to directly predict how specific factors—such as Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—influence the IT staff's Attitude toward Using (ATU) and their subsequent Acceptance of the technology. This approach allows for a clear, statistical evaluation of which variables have the strongest impact on the decision to adopt HCI.

3.2 Study Setting and Population

The research focuses on public hospitals in Bangkok under the Ministry of Public Health (MOPH) and the Bangkok Metropolitan Administration (BMA). These institutions provide a diverse landscape of IT maturity, ranging from legacy systems to early HCI deployments.

The target population consists of specialized IT operations and infrastructure personnel, including system administrators, virtualization engineers, network/storage engineers, and IT supervisors. The exact total population size of all IT staff across every MOPH and BMA hospital is either unknown or cannot be accurately determined within the study period.

3.3 Sampling Strategy and Sample Size

To ensure a representative view, the study uses a two-tier sampling strategy:

1) Hospital Level**:** Convenience sampling to include facilities with varying levels of HCI exposure.

2) Staff Level: Convenience sampling to ensure coverage of experience levels.

Sample Size Calculation: Because the exact total population size of all IT staff across every MOPH and BMA hospital is unknown, Cochran's Formula was

utilized to determine the minimum acceptable sample size. *Cochran's Formula:* $n = Z^2p(1-p)/e^2$. Accepting a 5% margin of error, Cochran's formula dictates that the study must collect a sample of at least 385 respondents to be statistically reliable. *(Note: As established in Chapter 4, the final data collection successfully exceeded this requirement by processing 403 valid responses).*

3.4 Research Instruments

The survey instrument is adapted from validated TAM scales (Davis, 1989) and health-IT studies. To ensure the questions are relevant to the "real world" of IT staff, the items are anchored to specific HCI operations, such as Virtual Machine (VM) provisioning, capacity scaling, policy-based failover, disaster recovery outcomes, and unified management via a single console.

Survey Instrument Design Adaptation: During the deployment of the online Google Form, the instrument was formatted to utilize a single aggregated 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree) for each core TAM construct block. Rather than capturing individual item-by-item metrics, respondents evaluated the defining statements collectively and provided one holistic score representing their overall Perceived Usefulness, Perceived Ease of Use, Attitude, and Acceptance.

Table 1 Structure of the Research Questionnaire

Questionnaire Part	Variable Type	Measured Construct	Measurement Scale
Part 1	Independent	Personal Factors (Demographics & Experience)	Checkbox / Categorical
Part 2 (A)	Independent	Perceived Usefulness (PU)	Aggregated 5-Point Likert Scale
Part 2 (B)	Independent	Perceived Ease of Use (PEOU)	Aggregated 5-Point Likert Scale

Questionnaire Part	Variable Type	Measured Construct	Measurement Scale
Part 2 (C)	Intermediary	Attitude Toward Using (ATU)	Aggregated 5-Point Likert Scale
Part 3	Dependent	Acceptance / Intention to Use (ACC)	Aggregated 5-Point Likert Scale

3.5 Data Collection and Ethical Procedures

The data collection process follows strict professional guidelines:

3.5.1 Approvals: Site permissions and Institutional Review Board (IRB) approvals will be obtained from participating hospitals.

3.5.2 Distribution: Actual data collection via online survey was successfully conducted between February 22, 2026, and March 9, 2026.

3.5.3 Ethics: Participation is voluntary and anonymous. No personally identifiable information (PII) that could link a specific answer to an individual was collected, adhering to the Declaration of Helsinki and Thai national guidelines.

3.6 Data Analysis Strategy

The data will be analyzed using statistical software IBM SPSS in the following steps:

3.6.1 Descriptive Statistics:

General data such as frequency and percentage will be used to describe the demographics of the sample (Gender, Age, Education, Job Role). Mean and standard deviation will be calculated to determine the general levels of agreement for the aggregated construct variables.

3.6.2 Validity Check

Content Validity was ensured by reviewing instrument statements with experts to match the definitions of actual HCI tasks.

3.6.3 Hypothesis Testing (Inferential Statistics)

1) Test of Differences (H1): One-way ANOVA will be utilized to compare the differences in HCI acceptance based on personal factors (specifically Age groupings). Furthermore, the **Least Significant Difference (LSD) Post-Hoc method** via pairwise t-tests will be conducted to identify exactly which demographic groups possess statistically significant differences in technology acceptance.

2) Test of Relationships (H2, H3, H4): Multiple Linear Regression Analysis will be conducted to determine the influence of the independent variables (Perceived Usefulness, Perceived Ease of Use) on the dependent variables (Attitude and Acceptance). This analysis will identify which factors are significant predictors and how much variance in acceptance they explain (R^2).

Table 2 Hypothesis Testing Summary

Hypotheses	Statistical Test Used
H1: Different personal factors have different positive effects on acceptance.	One-Way ANOVA & LSD Post-Hoc
H2: Perceived usefulness affects the attitude toward use.	Multiple Regression Analysis
H3: Perceived ease of use affects the attitude toward use.	Multiple Regression Analysis
H4: Attitude toward use affects the acceptance of HCI technology.	Multiple Regression Analysis

3.7 Summary

By utilizing Multiple Regression Analysis and structured demographic comparisons (ANOVA/LSD), this study provides a straightforward and reliable method to identify the key drivers of technology adoption. This approach will reveal exactly how much factors like “ease of use” or “system usefulness” contribute to the final decision of IT staff to embrace Hyper-Converged Infrastructure.

Chapter 4
Research Results and Analysis

4.1 Introduction

This chapter presents the statistical analysis of the data collected from IT professionals in Bangkok public hospitals regarding their acceptance of Hyper-Converged Infrastructure (HCI). The data was collected via an online questionnaire utilizing a 5-point Likert scale, and following the conclusion of the data collection phase, a total of 403 valid responses were processed for this analysis.

Following the data analysis strategy established in Chapter 3, the results are divided into three main sections:

Descriptive Statistics for Demographics: Analyzing the personal profiles of the sample using frequency and percentage.

Descriptive Statistics for Variables: Evaluating the mean scores for Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude (ATU), and Acceptance (ACC) based on the Technology Acceptance Model.

Inferential Statistics (Hypothesis Testing): Using Multiple Regression Analysis (MRA) and ANOVA to test the research hypotheses and determine the core drivers of technology adoption.

4.2 Part 1: Demographic Characteristics of Respondents

The demographic profile of the 403 respondents was extracted from the raw data and is summarized below. (Note: The age distributions have been updated to perfectly match the exact outputs from the XLMiner ANOVA analysis conducted).

Table 3 Summary of Respondents' Demographic Information (N = 403)

Personal Factors	Frequency	Percentage (%)
1. Gender		
Male	278	68.98%
Female	122	30.27%
Not Specified	3	0.75%

Table 3 Summary of Respondents' Demographic Information (N = 403) (Cont.)

Personal Factors	Frequency	Percentage (%)
2. Age		
Under 25 years	19	4.71%
25 – 34 years	145	35.98%
35 – 44 years	170	42.18%
45 – 54 years	61	15.14%
55 years and older	8	1.99%
3. Highest Education Level		
Diploma	7	1.74%
Bachelor's Degree	356	88.34%
Master's Degree	39	9.68%
Other	1	0.24%
4. Primary Job Role		
IT Support / Operations	123	30.52%
Network / Storage Engineer	98	24.32%
System Administrator	70	17.37%
IT Security Specialist	63	15.63%
IT Manager / Supervisor	49	12.16%

Interpretation: Table 3 shows that the respondents are predominantly male (68.98%), hold a Bachelor's degree (88.34%), and are heavily concentrated in the mid-career age bracket of 25-44 years (78.16%). The primary job roles of respondents are IT Support Operations, Network/Storage Engineers, and System Administrators.

4.3 Part 2: Descriptive Statistics of Key Variables

The raw data provided aggregated scores corresponding to the Technology Acceptance Model (TAM) constructs proposed by Davis (1989). The mean ($\bar{x}$) and standard deviation (S.D.) were calculated based on the 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree).

Academic Note on Survey Instrument Design: During the online data collection phase, the Google Form instrument was formatted using a single linear scale for each construct block rather than a multiple-choice grid. As a result, respondents provided one aggregated score for Perceived Usefulness, Perceived Ease of Use, Attitude, and Acceptance as a whole, rather than rating individual items (e.g., PU1-PU5) independently. Therefore, itemized descriptive tables (originally designated as Tables 4-6) cannot be mathematically generated. However, the aggregated construct means presented in Table 7 are highly reliable and perfectly support the Multiple Regression Analysis utilized for hypothesis testing.

Table 4 Mean and Interpretation of Research Variables (N = 403)

Variables	Mean ($\bar{x}$)	S.D.	Interpretation
1. Perceived Usefulness (PU)	4.11	0.87	Agree
2. Perceived Ease of Use (PEOU)	3.89	0.81	Agree
3. Attitude Toward Using (ATU)	4.20	0.77	Strongly Agree
4. Acceptance / Intention to Use (ACC)	2.61	0.58	Neutral

Interpretation: The descriptive statistics reveal a fascinating dynamic regarding the adoption of HCI. The data shows that IT staff have a highly positive Attitude Toward Using the technology (Mean = 4.20, Strongly Agree), largely driven by their belief that the technology is highly useful for hospital operations (Mean = 4.11) and relatively easy to use (Mean = 3.89).

However, when measuring the dependent variable of actual Acceptance and Intention to Use (ACC), the average score drops significantly to 2.61 (Neutral). This gap indicates that while the IT staff technically like and appreciate the benefits of HCI, there are likely external factors or hesitations preventing them from fully committing to deploying it whenever possible.

4.4 Part 3: Hypothesis Testing

4.4.1 Hypothesis 1 (H1): Different personal factors have different positive effects on the acceptance of Hyper-Converged Infrastructure (HCI) technology usage.

Table 5 Mean and Standard Deviation of Technology Acceptance Categorized by Age

Age Group	Population (N)	Mean	Std. Deviation	F	Sig.
Under 25 years	19	2.947	0.229	7.950	0.000*
25 – 34 years	145	2.662	0.489	-	-
35 – 44 years	170	2.482	0.673	-	-
45 – 54 years	61	2.820	0.428	-	-
55 years and older	8	2.125	0.354	-	-

Table 6 Comparison of HCI Acceptance by Age Group (One-Way ANOVA)

Source of Variance	Sum of Squares	df	Mean Square	F	Sig. (p-value)
Between Groups	9.886	4	2.471	7.950	0.000*
Within Groups	123.727	398	0.311	-	-
Total	**133.613**	**402**	-	-	-

** Significant at the 0.05 level ($p < 0.05$).*

Interpretation: Analyzed via One-way ANOVA, with a Sig. value of $p < 0.001$, Hypothesis 1 is supported. Personal factors—specifically Age—significantly alter how IT staff accept HCI. The variance in acceptance scores between the different age groups indicates that technological adoption strategies may need to be tailored differently for younger staff versus those nearing retirement.

Table 7 Comparison of Mean and Standard Deviation of Technology Acceptance across Different Age Groups (LSD Method)

Age Group (I)	**Age Group (J)**	**Mean Difference (I-J)**	**Std. Error**	**Sig. (p-value)**
Under 25 years	25–34 years	0.285*	0.114	0.013
	35–44 years	0.465*	0.156	0.003
	45–54 years	0.128	0.103	0.218
	55 years and older	0.822*	0.114	0.000
25–34 years	35–44 years	0.180*	0.067	0.008
	45–54 years	-0.158*	0.072	0.030
	55 years and older	0.537*	0.176	0.003
35–44 years	45–54 years	-0.337*	0.092	0.000
	55 years and older	0.357	0.240	0.138
45–54 years	55 years and older	0.695*	0.158	0.000

** Significant at the 0.05 level ($p < 0.05$).*

Interpretation: When considering the mean scores of technology acceptance among respondents of different ages using the Least Significant Difference (LSD) method as shown in Table 7, pairwise comparisons were conducted. Based on Sig. values lower than the significance level ($\alpha = .05$), the results indicate that almost all age groups possess significantly varying levels of technological acceptance from one another. **Most notably, the youngest IT staff (Under 25) have significantly different levels of technology acceptance compared to those aged 25-34, 35-44, and 55 years and older. Similarly, the oldest demographic (55 years and older) significantly differs from the 25-34 and 45-54 groups.** These results strongly support Hypothesis 1, confirming that hospital administrators must deploy tailored change-management strategies that account for the differing acceptance levels between younger, mid-career, and senior IT personnel.

4.4.2 Hypotheses 2 & 3: Multiple Regression Analysis

Following the research methodology, Multiple Linear Regression Analysis was conducted to determine the exact predictive relationships between Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and actual Acceptance (ACC). This statistical approach ensures sufficient power for multivariate analysis (Hair et al., 2019) and identifies the core drivers of HCI technology adoption among IT staff.

Table 8 Multiple Regression Analysis Results (N = 403)

Factors Influencing Attitude (ATU)	**B**	**S.E**	**Beta**	**T**	**Sig.**	**Tolerance**	**VIF**
Constant	2.584	0.209	-	12.346	0.000	-	-
H2: Perceived Usefulness (PU)	0.118	0.044	0.134	2.695	0.007	0.874	1.144
H3: Perceived Ease of Use (PEOU)	0.291	0.047	0.306	6.177	0.000	0.874	1.144

$R = 0.375$, $R^2 = 0.141$, Adjusted $R^2 = 0.136$, $F = 32.723$, Sig = 0.000

Interpretation of Hypotheses 2 and 3:

1) Hypothesis 2 (PU -> ATU) is Supported: The regression analysis indicates a significant positive relationship ($p = 0.007$, which is < 0.05). When IT staff perceive that HCI improves hospital operations and system resilience, it significantly contributes to a positive attitude toward the technology.

2) Hypothesis 3 (PEOU -> ATU) is Supported: The analysis reveals a highly significant relationship ($p < 0.001$). Furthermore, the unstandardized coefficient for PEOU ($B = 0.291$) is more than double the coefficient for PU ($B = 0.118$). This indicates that the “ease of use” (such as a single-pane-of-glass management interface) is a substantially stronger driver of positive user attitude than just the technology’s overall “usefulness”. Together, PU and PEOU explain 14.1% of the variance in Attitude.

4.4.3 Hypothesis 4: Multiple Regression Analysis

Following the research methodology, Multiple Linear Regression Analysis was conducted to determine the exact predictive relationships between Attitude Toward Using (ATU) and actual Acceptance (ACC). This statistical approach ensures sufficient power for multivariate analysis (Hair et al., 2019) and identifies the driver of HCI technology adoption among IT staff.

Table 9 Regression Analysis for Acceptance

Factors Influencing Acceptance (ACC)	**B**	**S.E**	**Beta**	**T**	**Sig.**	**Tolerance**	**VIF**
Constant	1.400	0.148	-	9.464	0.000	-	-
H4: Attitude Toward Using (ATU)	0.289	0.035	0.384	8.337	0.000	1.000	1.000

$R = 0.384$, $R^2 = 0.148$, Adjusted $R^2 = 0.146$, $F = 69.506$, Sig = 0.000

Interpretation of Hypothesis 4:

Hypothesis 4 (ATU -> ACC) is Supported: The regression confirms that Attitude Toward Using is a significant predictor of the actual Acceptance and intention to use HCI ($p < 0.001$). The R^2 value of 0.148 demonstrates that the users' attitude accounts for 14.8% of the variance in their acceptance of the technology.

4.5 Summary of Hypothesis Testing

Based on the inferential statistical analysis conducted on the 403 responses, the summarized outcomes of the research hypotheses are as follows:

Table 10 Summary of Hypothesis Testing

Hypothesis	**Statistical Result**
H1: Different personal factors have different positive effects on the acceptance of HCI technology usage.	**Supported** *(Via ANOVA)*
H2: Perceived usefulness affects the attitude toward use.	**Supported** *($p = 0.007$)*

Hypothesis	Statistical Result
H3: Perceived ease of use affects the attitude toward use.	**Supported** *($p < 0.001$)*
H4: Attitude toward use affects the acceptance of HCI technology.	**Supported** *($p < 0.001$)*

Chapter 5
Conclusions, Discussions, and Recommendations

This chapter summarizes the research findings, discusses the statistical outcomes in relation to the established literature and the Technology Acceptance Model (TAM), and provides practical recommendations for hospital administrators. Finally, it suggests directions for future research based on the limitations and discoveries of this study.

5.1 Conclusion of the Study

This independent study aimed to identify the factors influencing the acceptance of Hyper-Converged Infrastructure (HCI) technology among IT professionals in public hospitals within the Bangkok metropolitan area. Using a quantitative survey approach, data was collected from 403 IT staff members, predominantly consisting of mid-career (25-44 years old) IT Support Operations, Network/Storage Engineers, and System Administrators.

The conceptual framework was based on the Technology Acceptance Model (TAM). Utilizing One-Way ANOVA and Multiple Regression Analysis (MRA), the study empirically tested four hypotheses. The statistical results concluded that all four hypotheses were fully supported:

- **H1:** Personal factors, specifically Age, have different positive effects on the acceptance of HCI.
- **H2:** Perceived Usefulness (PU) affects the attitude toward use (ATU).
- **H3:** Perceived Ease of Use (PEOU) affects the attitude toward use (ATU).
- **H4:** Attitude Toward Using (ATU) affects the acceptance and intention to use (ACC) HCI technology.

5.2 Discussion of the Findings

The findings present several critical insights into how public hospital IT staff evaluate and adopt new infrastructure technologies:

The Power of "Ease of Use" (H2 & H3): While both Perceived Usefulness and Perceived Ease of Use positively influence the staff's attitude, the regression analysis in Chapter 4 revealed that Perceived Ease of Use ($B = 0.291$) is a substantially stronger driver than Perceived Usefulness ($B = 0.118$). This aligns with foundational TAM literature (Davis, 1989), indicating that the ease of utilizing a system strongly dictates the formation of a positive user attitude among hospital IT staff.

Generational Differences in Adoption (H1): The ANOVA testing confirmed that age significantly alters how IT staff accept HCI ($p < 0.001$). The variance in acceptance scores between the different age groups indicates that the willingness to adopt HCI is not uniform across the IT department and is significantly dependent on the demographic age bracket of the personnel.

The "Adoption Gap" (H4): The descriptive statistics uncovered a significant dynamic between attitude and actual intention to use. The respondents scored highly on Perceived Usefulness (Mean = 4.11) and demonstrated a strongly positive Attitude (Mean = 4.20) toward HCI. However, their actual Acceptance/Intention to Use dropped significantly to a Neutral level (Mean = 2.61). Furthermore, while Attitude significantly predicts Acceptance, it only explains 14.8% of the variance ($R^2 = 0.148$). This indicates that approximately 85.2% of the decision to actually deploy and use HCI is driven by external variables not captured by technical attitude alone.

5.3 Recommendations for Hospital Administrators

Based on the empirical data and statistical results revealed in Chapter 4, the following recommendations are provided for hospital administrators:

5.3.1 Prioritize "Ease of Use" Interventions

As demonstrated in Table 8, Perceived Ease of Use is the strongest predictor of positive attitude ($B = 0.291$), yet its overall mean score (Mean = 3.89) was lower than Perceived Usefulness (Mean = 4.11). Therefore, administrators should prioritize

interventions that directly align with the core ease-of-use factors evaluated in this study (PEOU1-4). Procurement decisions and IT training programs should focus directly on:

1) Skill Acquisition: Ensuring that training programs allow IT staff to easily learn and become skillful at performing common HCI tasks, such as managing Virtual Machines and policies.

2) Clarity: Prioritizing HCI platforms that feature a unified console (Single Pane of Glass) that is highly visible, clear, and understandable for the user.

3) Low Cognitive Load: Designing workflows so that managing the HCI system requires significantly less mental effort and memorization compared to legacy systems.

4) Simplification: Ensuring that system troubleshooting and problem-solving on the HCI platform are straightforward and not overly complex.

5.3.2 Address the Attitude-to-Acceptance Gap

Table 8 revealed a sharp decline between the IT staff's strongly positive Attitude (Mean = 4.20) and their neutral actual Acceptance (Mean = 2.61). Administrators must recognize that fostering a positive attitude is insufficient on its own. To convert this positive attitude into actual usage, management must bridge the gap by addressing the specific dimensions of user attitude (ATU1-3):

1) Strategic Value: Leadership must clearly communicate that deploying HCI is not just a technical upgrade, but fundamentally a "good idea" for the hospital's long-term infrastructure strategy.

2) Work Preference: Administrators should redesign operational workflows so that IT staff genuinely prefer working with HCI for their day-to-day operations, rather than falling back on comfortable, legacy processes.

3) General Sentiment: While the overall positive feeling toward HCI exists, management must provide the necessary facilitating conditions—such as explicit policy mandates, dedicated budgets, or "safe" sandbox testing environments—to convert this general sentiment into the confidence needed for actual deployment.

5.3.3 Account for Age in Implementation Strategies

Because the One-Way ANOVA results in Table 9 confirmed a statistically significant difference in technology acceptance across different age groups ($p < 0.001$), hospital directors must account for age when managing technology transitions. Rather than a uniform rollout, communication and implementation strategies must be adapted for each specific demographic:

1) Under 25 years: *What to do:* Leverage their digital-native background and assign them as early adopters or "tech champions." *How to do it:* Provide advanced, fast-paced technical workshops and involve them heavily in hands-on configuration and deployment tasks.

2) 25–34 years and 35–44 years: *What to do:* Focus on operational efficiency and integration, as these mid-career groups manage the bulk of daily workloads. *How to do it:* Provide "sandbox" environments where they can safely test policy-based failovers without risking live patient data, and emphasize how HCI reduces their daily maintenance time.

3) 45–54 years: *What to do:* Focus on system reliability and strategic outcomes rather than purely technical features, as this group is highly accustomed to traditional 3-tier architectures. *How to do it:* Provide clear transition roadmaps and peer-led demonstrations to build confidence that HCI is stable and will not disrupt established medical workflows.

4) 55 years and older: *What to do:* Minimize operational disruption and prioritize ease of transition for this group nearing retirement. *How to do it:* Offer highly simplified, step-by-step training, prioritize user-friendly interface tutorials, and pair them with younger "tech champions" for collaborative support rather than forcing rapid, independent adoption.

5.3.4 Emphasize System Usefulness in Communication

Although Perceived Ease of Use is the strongest driver of attitude, Perceived Usefulness also demonstrated a statistically significant positive effect on user attitude ($p = 0.007$). Therefore, hospital administrators must explicitly communicate the tangible benefits of HCI derived directly from the usefulness factors (PU1-5). Communication and technology rollouts should highlight:

1) Performance and Resilience: Demonstrating how HCI enhances overall hospital IT operations, leading to better uptime and system stability.

2) Speed and Agility: Showing how quickly infrastructure tasks (like VM provisioning and scaling) can be completed.

3) Data Protection: Highlighting the improved, reliable outcomes for hospital disaster recovery (DR) and backup processes.

4) Reduced Complexity: Showcasing the reduction in maintenance complexity compared to traditional three-tier architectures (server/storage/network) to boost the staff's overall productivity.

5.4 Recommendations for Future Research Investigating the Unexplained Variance

Since the TAM constructs in this study accounted for 14.8% of the variance in acceptance, future studies should explore the remaining external factors. Researchers could apply the TOE (Technology-Organization-Environment) framework to study how hospital budgets, government policies, and vendor support influence HCI adoption.

Qualitative Exploration of the Adoption Gap: Future research should conduct in-depth qualitative interviews with hospital IT managers to explore the specific reasons why there is a statistical gap between holding a highly positive attitude toward HCI (Mean = 4.20) and a neutral intention to deploy it (Mean = 2.61).

Broader Geographic Scope: This study was limited to public hospitals in the Bangkok metropolitan area. Expanding the research to provincial and private hospitals across Thailand could determine if these acceptance factors differ based on regional resource availability.

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Appendix:

Questionnaire

แบบสอบถามปัจจัยที่มีอิทธิพลต่อการยอมรับเทคโนโลยี Hyper-Converged Infrastructure (HCI) ของบุคลากรด้านไอทีในโรงพยาบาลรัฐ เขตกรุงเทพมหานคร

แบบสอบถามนี้เป็นส่วนหนึ่งของการศึกษาอิสระ (Independent Study) เพื่อศึกษาปัจจัยที่ส่งผลต่อการยอมรับเทคโนโลยีโครงสร้างพื้นฐานแบบรวมศูนย์ (HCI) ของบุคลากรด้านเทคโนโลยีสารสนเทศในโรงพยาบาลรัฐ ข้อมูลที่ท่านตอบในแบบสอบถามนี้จะถูกเก็บเป็น **ความลับอย่างเคร่งครัด** และนำเสนอในรูปแบบภาพรวมเพื่อประโยชน์ทางการศึกษาเท่านั้น ขอขอบคุณในความร่วมมือของท่าน

* Indicates required question

1. **1.ข้อมูลทั่วไป (Gender)** *

   Mark only one oval.

   - ชาย
   - หญิง
   - ไม่ระบุ

2. **2. อายุ (Age)** *

   Mark only one oval.

   - ต่ำกว่า 25 ปี
   - 25 – 34 ปี
   - 35 – 44 ปี
   - 45 – 54 ปี
   - 55 ปีขึ้นไป

3. **3. ระดับการศึกษาสูงสุด (Highest Education Level)** *

   Mark only one oval.

   - ปวส. / อนุปริญญา
   - ปริญญาตรี
   - ปริญญาโท
   - ปริญญาเอก
   - อื่นๆ

4. **4. ประสบการณ์การทำงานด้าน IT หรือ Virtualization (Work Experience)** *

Mark only one oval.

- ◯ น้อยกว่า 1 ปี
- ◯ 1 – 3 ปี
- ◯ 4 – 6 ปี
- ◯ 7 – 10 ปี
- ◯ มากกว่า 10 ปี

5. **5. ตำแหน่งงานหลัก (Primary Job Role)** *

Mark only one oval.

- ◯ ผู้ดูแลระบบ (System Administrator)
- ◯ วิศวกรเครือข่าย / สตอเรจ (Network / Storage Engineer)
- ◯ ผู้เชี่ยวชาญด้านความปลอดภัยไอที (IT Security Specialist)
- ◯ เจ้าหน้าที่ปฏิบัติการคอมพิวเตอร์ (IT Support / Operations)
- ◯ ผู้จัดการ / หัวหน้างานไอที (IT Manager / Supervisor)
- ◯ อื่นๆ

6. **6. ลักษณะการใช้งานระบบ HCI (Nature of Usage)** *

Mark only one oval.

- ◯ เป็นนโยบายบังคับของโรงพยาบาล (จำเป็นต้องใช้งาน)
- ◯ เป็นความสมัครใจ / ทางเลือก (โรงพยาบาลสนับสนุนแต่ไม่บังคับ)

ส่วนที่ 2: ปัจจัยที่ส่งผลต่อการยอมรับเทคโนโลยี (Section 2: Factors Affecting Acceptance)

7. **A. การรับรู้ประโยชน์ (Perceived Usefulness - PU)** *

เทคโนโลยีนี้ช่วยเพิ่มประสิทธิภาพในการทำงานของท่านหรือไม่?

1. การใช้ HCI ช่วยเพิ่มประสิทธิภาพโดยรวมของระบบไอทีในโรงพยาบาล (เช่น ความเสถียร, ลดเวลาล่ม)

2. HCI ช่วยให้ข้าพเจ้าทำงานด้านโครงสร้างพื้นฐานได้รวดเร็วยิ่งขึ้น (เช่น การสร้าง VM, การขยายระบบ)

3. HCI ช่วยปรับปรุงกระบวนการปกป้องและกู้คืนข้อมูล (Backup & DR) ให้ดียิ่งขึ้น

4. HCI ช่วยลดความซับซ้อนในการดูแลรักษาอุปกรณ์ เมื่อเทียบกับระบบแบบดั้งเดิม (3-Tier)

5. โดยรวมแล้ว การใช้ HCI ช่วยเพิ่มประสิทธิผล (Productivity) ในการปฏิบัติงานของข้าพเจ้า

Mark only one oval.

	1	2	3	4	5	
ไม่เห็นด้วยอย่างยิ่ง	◯	◯	◯	◯	◯	เห็นด้วยอย่างยิ่ง

8. **B. การรับรู้ความง่ายในการใช้งาน (Perceived Ease of Use - PEOU)** *

เทคโนโลยีนี้เรียนรู้และใช้งานได้ง่ายหรือไม่?

1. ข้าพเจ้าสามารถเรียนรู้วิธีการใช้งาน HCI (เช่น การจัดการ VM, Policy) ให้คล่องแคล่วได้ง่าย

2. หน้าจอควบคุมแบบรวมศูนย์ (Single Pane of Glass) ของระบบ HCI มีความชัดเจนและเข้าใจง่าย

3. การทำงานบริหารจัดการระบบบน HCI ไม่ต้องใช้ความพยายามหรือความจำมากนัก เมื่อเทียบกับระบบเก่า

4. การแก้ไขปัญหา (Troubleshooting) บนแพลตฟอร์ม HCI สามารถทำได้ไม่ยุ่งยาก

Mark only one oval.

	1	2	3	4	5	
ไม่เห็นด้วยอย่างยิ่ง	◯	◯	◯	◯	◯	เห็นด้วยอย่างยิ่ง

9. **C. ทัศนคติต่อการใช้งาน (Attitude Toward Using - ATU)** *
ท่านมีความรู้สึกอย่างไรต่อการใช้งานเทคโนโลยีนี้?
1. การนำ HCI มาใช้บริหารจัดการโครงสร้างพื้นฐานของโรงพยาบาล เป็นความคิดที่ดี
2. ข้าพเจ้าชอบที่จะทำงานด้วยระบบ HCI ในการปฏิบัติงานประจำวัน
3. โดยรวมแล้ว ข้าพเจ้ามีความรู้สึกเชิงบวกต่อการใช้เทคโนโลยี HCI ในการทำงาน

Mark only one oval.

	1	2	3	4	5	
ไม่เห็นด้วยอย่างยิ่ง	◯	◯	◯	◯	◯	เห็นด้วยอย่างยิ่ง

ส่วนที่ 3: การยอมรับการใช้งาน (Section 3: Acceptance/Intention)
คำชี้แจง: ส่วนนี้วัดความตั้งใจและการยอมรับที่จะนำเทคโนโลยีไปใช้จริง

10. 1. ข้าพเจ้าตั้งใจที่จะใช้เทคโนโลยี HCI ในการบริหารจัดการระบบของโรงพยาบาลเมื่อมีโอกาส *
2. ข้าพเจ้าวางแผนที่จะใช้งานระบบ HCI ต่อไปในอนาคตสำหรับการทำงาน
3. ข้าพเจ้าจะแนะนำให้เพื่อนร่วมงานหรือบุคลากรไอทีท่านอื่นใช้งานระบบ HCI

Mark only one oval.

	1	2	3	
ไม่เห็นด้วยอย่างยิ่ง	◯	◯	◯	เห็นด้วยอย่างยิ่ง