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Driving the Adoption of TPC-OHCIS in Perlis: An Integrated UTAUT and DOI Analysis of Healthcare Staff Acceptance

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ABSTRACT

System acceptance is crucial for improving the quality, efficiency, and continuity of primary healthcare services through the integration of digital health systems into healthcare practice in Malaysia. This study investigates the antecedents of healthcare staff acceptance toward the Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) by integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) frameworks in the context of Perlis. Data were collected from 225 healthcare professionals across eight government clinics using purposive sampling and were analysed using multiple regression analysis in SPSS within a quantitative cross-sectional design. The results showed that the final integrated model accounted for 70.9% of the variance in behavioural intention. Importantly, acceptance in this context was not significantly influenced by Performance Expectancy and Effort Expectancy, indicating that peer support and experiential engagement were more influential determinants than perceived ease of use or expected job-performance improvement. These findings provide practical implications for policymakers and healthcare administrators to prioritize social reinforcement and experiential learning mechanisms, which may contribute to the sustained utilization of digital health systems in Malaysian primary healthcare settings.

Keywords: TPC-OHCIS, Healthcare Staff Acceptance, UTAUT, DOI

1. INTRODUCTION

The Ministry of Health Malaysia introduced the Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) to support the digital integration of primary healthcare and dental services. The system aims to improve workflow efficiency and patient management through integrated digital information pathways accessible to authorized healthcare staff. Although the system has the potential to improve healthcare delivery, its implementation across healthcare settings remains limited, particularly in Perlis. This highlights the need to better understand healthcare staff acceptance of the system. Previous Malaysian studies have mainly focused on system usability, patient satisfaction, and user experience in digital healthcare systems (Ibrahim et al., 2022; Tuan, 2020). However, limited attention has been given to behavioural and innovation-related factors influencing healthcare staff acceptance, particularly constructs such as social influence, relative advantage, and trialability. This indicates a clear research gap in understanding healthcare staff adoption behaviour from both behavioural and innovation perspectives within the Malaysian primary healthcare context. In particular, existing studies have not sufficiently explained how these factors jointly influence the acceptance of systems such as TPC-OHCIS. To address this gap, this study integrates the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Diffusion of Innovation (DOI) framework. The UTAUT framework explains behavioural determinants such as performance expectancy, effort expectancy, and social influence, while the DOI framework complements this by capturing innovation-related characteristics, particularly relative advantage and trialability. The integration of both frameworks provides a more comprehensive model for explaining healthcare staff's behavioural

intention to use TPC-OHCIS. Although previous studies, such as Shiferaw and Mehari (2019), have examined healthcare technology acceptance, more recent and context-specific evidence is needed to better explain healthcare staff acceptance of TPC-OHCIS in Malaysian primary healthcare settings, particularly in Perlis. Despite the increasing implementation of TPC-OHCIS in Malaysia, limited studies have examined healthcare staff acceptance from both behavioural and innovation perspectives, particularly in Perlis primary healthcare clinics. Therefore, this study addresses this gap by integrating the UTAUT and DOI frameworks to provide a more comprehensive understanding of factors influencing healthcare staff's behavioural intention to use TPC-OHCIS. The findings are expected to contribute to improved strategies for sustainable digital healthcare implementation in Malaysia.

2. LITERATURE REVIEW

Digital health technologies have been widely recognized for improving healthcare delivery, patient management, and administrative efficiency. (MIMOS Berhad, 2020). In Malaysia, the Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) integrates primary healthcare and dental services into a single platform, improving continuity of care through shared patient records across clinics and streamlining patient workflow (LAPORAN TAHUNAN KKM, 2019). Although digital health systems offer multiple benefits, their successful implementation depends on healthcare staff acceptance, which is influenced by both behavioural and innovation-related factor (Shiferaw & Mehari 2019; Ibrahim et al., 2022; Tuan Soh, 2020). This study adopts an integrated approach by combining the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) frameworks. The UTAUT framework explains behavioural intention through constructs such as performance expectancy, effort expectancy, and social influence, while the DOI framework highlights relative advantage and trialability as important factors influencing technology adoption in organizations (Rogers, 1983; Abdekhoda et al., 2016).

The integrated framework examines behavioural and innovation-related factors influencing acceptance of TPC-OHCIS in public primary healthcare clinics in Perlis. Previous empirical studies have shown that digital health adoption is influenced by perceived usefulness, ease of use, peer support, and system usability (Tan et al., 2024; Shaharul et al., 2023; Tuan Soh, 2020). Ibrahim et al. (2022) reported that TPC-OHCIS improved patient communication and service quality in Malaysian healthcare settings. Although previous studies have examined behavioural intention and innovation characteristics, further research is still needed in these areas, particularly within the Malaysian healthcare context (2022). International studies have shown that social influence, perceived benefits, and trialability significantly affect healthcare staff acceptance of digital health technologies (Abdekhoda et al., 2016; Putteeraj et al., 2021; Liu et al., 2023)

2.1 Conceptual Framework

This study's conceptual framework integrates the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) models to identify determinants influencing healthcare staff's behavioural intention to use the TPC-OHCIS system. In this structural model, the dependent variable is Behavioural Intention to Use TPC-OHCIS, which represents healthcare staff acceptance of the technology. The proposed outcome is influenced by Performance Expectancy, Effort Expectancy, and Social Influence derived from the UTAUT framework, as well as Relative Advantage and Trialability derived from the DOI framework. Specifically, this study examines whether behavioural factors such as Effort Expectancy and Performance Expectancy, together with innovation characteristics including Relative Advantage and Trialability, influence healthcare staff adoption of TPC-OHCIS. This study addresses a gap in the Malaysian literature, which has mainly focused on usability-related factors rather than behavioural and innovation-related dimensions, by integrating the UTAUT and DOI frameworks.

This integrated framework provides a more comprehensive understanding of how organizational support, social influence, and innovation characteristics affect healthcare professionals' intention to adopt the system in Perlis.

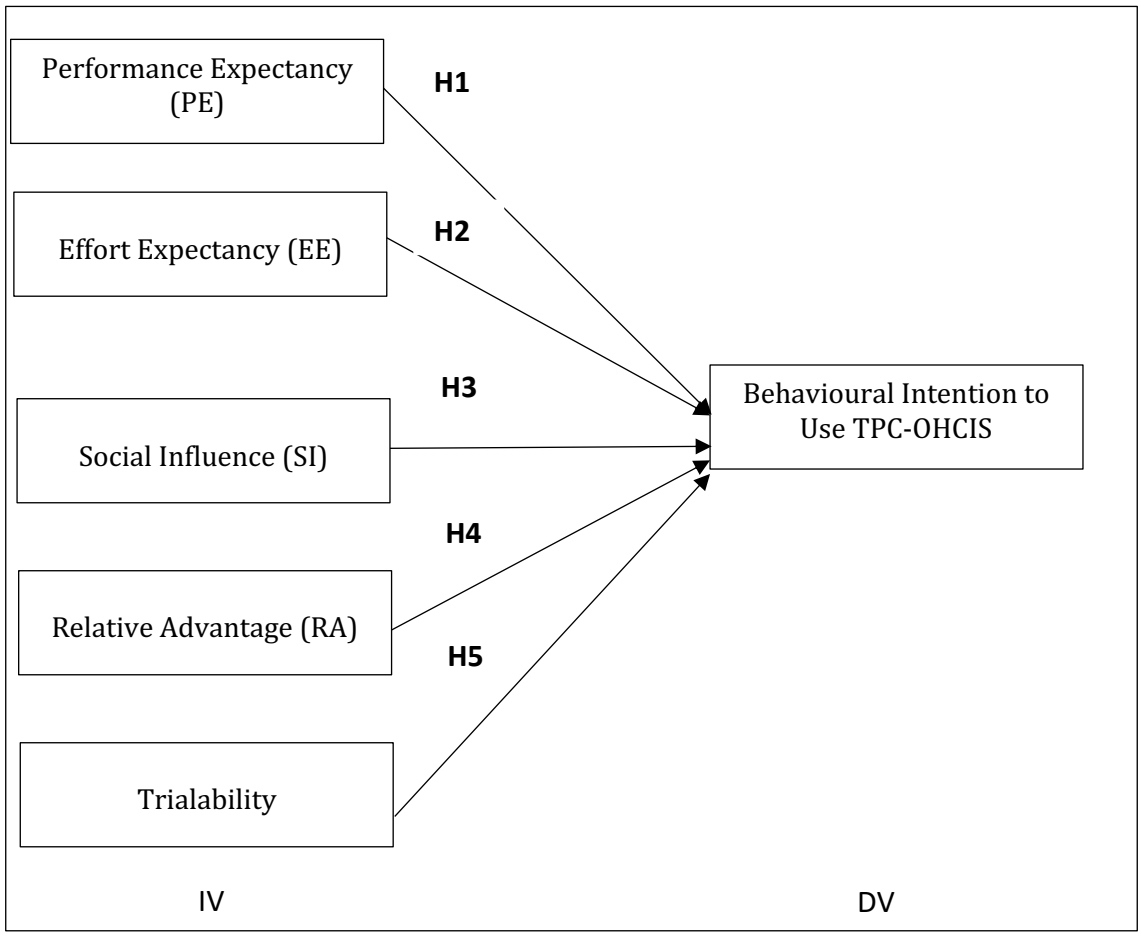

Figure 1. Conceptual Framework based on UTAUT and DOI construct

2.2 Hypothesis Development

Five main hypotheses were developed to examine healthcare staff acceptance of the TPC-OHCIS system. These hypotheses incorporate behavioural determinants from the UTAUT framework and innovation-related attributes from the DOI model.

The hypotheses:

- H1: Performance Expectancy has a positive effect on healthcare staff's behavioural intention to use TPC-OHCIS.
- H2: Effort Expectancy has a positive effect on healthcare staff's behavioural intention to use TPC-OHCIS.
- H3: Social Influence has a positive effect on healthcare staff's behavioural intention to use TPC-OHCIS.
- H4: Relative Advantage has a positive effect on healthcare staff's behavioural intention to use TPC-OHCIS.
- H5: Trialability positively influences healthcare staff's behavioural intention to use TPC-OHCIS.

3. METHODOLOGY

3.1 Research Design & Procedure

This study employed a quantitative cross-sectional research design to assess healthcare workers' acceptance of the TPC-OHCIS system in Perlis. Data were collected using a structured questionnaire distributed to staff working in eight government-operated primary health clinics. The questionnaire allowed participants sufficient time to provide responses regarding their experiences using the digital healthcare system.

3.2 Sampling & Instrumentation

From a population of 541 healthcare personnel, purposive sampling was used to select 225 respondents for the study. This sampling approach ensured that all participants had direct experience using TPC-OHCIS, which improved the validity of the behavioural data collected. The research instrument was adapted from existing UTAUT and DOI constructs and measured variables using a 5-point Likert scale, including Performance Expectancy, Effort Expectancy, and Trialability.

Table 1. Staff Population Using TPC-OHCIS System

Public Health Clinic	Number Of Staff Using TPC-OHCIS System
KK Kangar	142
KK Beseri	92
KK Simpang Empat	57
KK UTC Kangar	52
KK Kuala Perlis	106
KK Padang Besar	81
KK Arau	6
KK Kaki Bukit	5
Total	541

3.3 Research Instrument

A structured questionnaire adapted from the UTAUT and DOI constructs was used for data collection. The questionnaire included demographic information, as well as Behavioral Intention (BI), Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Relative Advantage (RA) and Trialability (TR). A pilot test was conducted to ensure the reliability and clarity of the questionnaire items measured using a 5-point Likert scale.

Table 2. Section Of Questionnaire

Section	No.Of Items	Variables
A	9	Respondents' Socioeconomic Profile
B	6	Use of Technology and Health Systems
C	3	Behavioral Intention (BI)
D	4	Performance Expectancy (PE)
E	4	Effort Expectancy (EE)
F	4	Social Influence (SI)
G	5	Relative Advantage (RA)
H	5	Trialability

3.4 Analysis Method

Data was analysed using SPSS Version 31. Respondent profiles were analysed using descriptive statistics, including mean, standard deviation, frequency, and percentage. Reliability analysis using Cronbach's alpha, Pearson correlation analysis, and multiple regression analysis were conducted to identify predictors of behavioural intention toward using TPC-OHCIS.

4. RESULT

4.1 Demographic Profile of Respondent

The demographic profiles of the 225 healthcare staff respondents using the TPC-OHCIS system in Perlis are summarized in Table 3. Health officers represented the largest professional group (48.4%), followed by health administrators (20.0%) and nurses (19.6%). The workforce was predominantly female (82.7%), with most respondents aged between 31 and 40 years (50.7%). Most participants lived in urban areas (71.1%), and the majority were Malay (82.7%). In terms of marital status, 79.1% of respondents were married, while 55.1% held bachelor's degrees. Data were collected from eight clinics, with the highest response rates recorded at KK UTC Kangar (14.2%) and KK Beseri (13.8%). These findings suggest that the system is primarily used by educated, mid-career healthcare professionals working in urban primary care settings.

Table 3. Demographic Profile of Respondent

Variables	Categories	Frequency
Category	Doctors	5.8%(13)
	Nurses	19.6%(44)
	Health Officers	48.4%(109)
	Health Administrators	20.0%(45)
	Others	6.2%(14)
Place Of Residence	Urban	71.1%(160)
	Rural	28.4%(64)
	Missing	0.4%(1)
Health Clinic	KK Kangar	13.3%(30)
	KK Beseri	13.8%(31)
	KK Simpang Empat	11.1%(25)
	KK UTC Kangar	14.2%(32)
	KK Kuala Perlis	12.0%(27)
	KK Padang Besar	12.0%(27)
	KK Arau	12.0%(27)
	KK Kaki Bukit	11.6%(26)
Gender	Male	17.3%(39)
	Female	82.7%(186)
Age	20 Years And Below	0.4%(1)
	21 To 30 Years	12.9%(29)
	31 To 40 Years	50.7%(114)
	41 To 50 Years	33.8%(76)
	50 Years And Above	2.2%(5)
Ethnicity	Malay	82.7%(186)
	Chinese	6.2%(14)
	Indian	8.9%(20)
	Iban (Others)	0.9%(2)
	Sabah (Others)	1.3%(3)
Marital Status	Single	15.6%(35)
	Married	79.1%(178)
	Divorced/Widowed	5.3%(12)

4.2 Reliability of Measures

As shown in Table 4, all constructs exceeded the Cronbach's alpha threshold of 0.70, indicating high internal consistency. Trialability recorded the highest reliability score (0.941), while Social Influence showed the lowest (0.866); however, both values indicate excellent reliability for behavioral research.

Table 4. Reliability Test

Variables	Cronbach Alpha	No. of Items
Behavioural Intention	0.910	3
Performance Expectancy	0.936	4
Effort Expectancy	0.912	4
Social Influence	0.866	4
Relative Advantage	0.899	5
Trialability	0.941	5

4.3 Correlation and Model Fit

Pearson correlation analysis showed that all independent variables had significant positive relationships with Behavioural Intention ($p < 0.001$). Relative Advantage demonstrated the strongest relationship with Behavioural Intention ($r = 0.816$). In addition, the model summary in Table 7 showed an Adjusted R Square value of 0.709, indicating that the integrated UTAUT and DOI model explained 70.9% of the variance in healthcare staff intention to use the system.

Table 5. Correlations

		BI	**PE**	**EE**	**SI**	**RA**	**T**
BI	Pearson Correlation	1	0.700***	0.727***	0.757***	0.816***	0.770***
	Sig(2-tailed)		<0.001	<0.001	<0.001	<0.001	<0.001
	N	225	225	225	225	225	225
PE	Pearson Correlation	0.700***	1	0.746***	0.780***	0.794***	0.749***
	Sig(2-tailed)	<0.001		<0.001	<0.001	<0.001	<0.001
	N	225	225	225	225	225	225
EE	Pearson Correlation	0.727***	0.746***	1	0.707***	0.816***	0.948***
	Sig(2-tailed)	<0.001	<0.001		<0.001	<0.001	<0.001
	N	225	225	225	225	225	225
SI	Pearson Correlation	0.757***	0.780***	0.707***	1	0.779***	0.718***
	Sig(2-tailed)	<0.001	<0.001	<0.001		<0.001	<0.001
	N	225	225	225	225	225	225
RA	Pearson Correlation	0.816***	0.794***	0.816***	0.779***	1	0.862***
	Sig(2-tailed)	<0.001	<0.001	<0.001	<0.001		<0.001
	N	225	225	225	225	225	225
T	Pearson Correlation	0.770***	0.749***	0.948***	0.718***	0.862***	1
	Sig(2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	
	N	225	225	225	225	225	225

4.4 Multiple Regression Coefficients

The analysis showed that Relative Advantage was the strongest predictor (beta = 0.416, p < 0.001), indicating that healthcare staff were more likely to use the system when they perceived greater benefits compared to previous methods. Social Influence (beta = 0.298, p < 0.001) and Trialability (beta = 0.303, p = 0.019) also showed significant positive effects on system adoption. The findings suggest that behavioural intention to use the system was influenced by peer support, managerial encouragement, and opportunities for staff to experiment with the technology. Therefore, H1 and H2 were not supported. This finding indicates that for healthcare providers in Perlis, facilitating conditions and innovation-related advantages were more important determinants of adoption than perceived ease of use or expected performance improvements. Overall, the model demonstrated a good fit, with the independent variables accounting for 70.9% of the variance in behavioural intention.

Table 6. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Std. Error	T	Sig.
	B	Std. Error	Beta		
Behavioral Intention	0.144	0.173		0.835	0.405
Performance Expectancy	-0.018	0.070	-0.017	-0.257	0.798
Effort Expectancy	-0.099	0.116	-0.098	-0.851	0.396
Social Influence	0.327	0.070	0.298	4.675	<0.001
Relative Advantage	0.455	0.091	0.416	4.991	<0.001
Trialability	0.318	0.135	0.303	2.358	0.019

4.5 Model Summary analysis

Table 7 presents the results of model summary analyses assessing how well the combined UTAUT and DOI model explains the system adoption. Multiple correlation analysis showed a strong positive association between Trialability, Social Influence, Performance Expectancy, Relative Advantage, Effort Expectancy, and healthcare staff's Behavioural Intention to use TPC-OHCIS (R = 0.846). The model demonstrated good predictive accuracy, with a Standard Error of the Estimate of 0.41631. Collectively, these findings suggest that the theoretically derived constructs provide a comprehensive explanation for digital health system adoption in this primary healthcare context.

Table 7. Model Summary Analysis

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	0.846a	0.715	0.709	0.41631

a) Predictors: (Constant), Trialability, Social Influence, Performance Expectancy, Relative Advantage, Effort Expectancy
b) Dependent Variable: Behavioral Intention

4.6 Hypothesis testing results

As shown in Table 8, three out of the five hypotheses are supported by the results of the tests of significance. Social Influence (H3), Relative Advantage (H4), and Trialability (H5) were accepted

indicating these variables positively and significantly affect users' behavioural intention to use the TPC-OHCIS system. On the contrary Performance Expectancy (H1) and Effort Expectancy (H2) were rejected. This indicates that the challenge to traditional views of importance of these factors in technology adoption, as the intention to use the system of the healthcare staff of Perlis was not significantly related to these factors. Thus, we conclude that social support, perceived advantages over traditional methods, and the opportunity to trial the system were the main facilitators to digital health uptake in this clinical context.

Table 8. Hypothesis Testing

	Hypothesis Statement	Result
H1	Performance expectancy has a positive and significant relationship with healthcare staff's behavioral intention to use the TPC-OHCIS system.	Not Accepted
H2	Effort expectancy has a positive and significant relationship with healthcare staff's behavioral intention to use the TPC-OHCIS system.	Not Accepted
H3	Social influence has a positive and significant effect on healthcare staff's behavioral intention to use the TPC-OHCIS system.	Accepted
H4	Relative advantage has a positive and significant relationship with behavioral intention to use the TPC-OHCIS system	Accepted
H5	Trialability has a positive and significant relationship with behavioral intention to use the TPC-OHCIS system.	Accepted

5. DISCUSSION

The Discussion section synthesizes the study's findings to explain the factors influencing the adoption of the Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) in Perlis. By integrating the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) frameworks, the study reveals that Social Influence, Relative Advantage, and Trialability are the primary drivers of behavioral intention to use the system. This indicates that staff adoption is heavily influenced by the encouragement of peers and management, the perceived benefits of the system over existing workflows, and the ability to experiment with the technology before full implementation. Theoretically, these results emphasize that in real-world clinical settings, social reinforcement and innovation-related characteristics carry more weight than the system's technical complexity or perceived ease of use. In contrast, Performance Expectancy and Effort Expectancy were found to be non-significant predictors, suggesting that expected job performance gains and the perceived ease of use did not determine the staff's intention to adopt the system in this specific context. These findings have important practical and policy implications for the Ministry of Health Malaysia and healthcare administrators. To ensure sustainable digital health implementation, strategies should prioritize strengthening supervisory support, highlighting tangible benefits like workflow efficiency, and providing hands-on training opportunities. Ultimately, the study demonstrates that successful digital transformation in primary care depends not only on system functionality but also on fostering a supportive social and experiential environment for healthcare professionals.

The discussion section synthesizes the study findings to elucidate the adoption of Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) in Perlis. The findings of the study, which combines the Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) frameworks, show that Social Influence, Relative Advantage, and Trialability are the main factors affecting using intention of the system. This means that the staff level driving adoption is primarily driven by peer and management encouragement, the relative benefits of the system over current workflows, and whether the technology can be piloted before full deployment. These findings highlight that at least in a practical clinical context—social reinforcement and attributes related to the innovation itself are more important than either technical complexity or ease of use when implementing the system. Whereas it was found that Performance Expectancy and Effort Expectancy were non-significant, which means that the expected job performance increase and perceived ease of use did not account for the staff's intention to use the flight tracking system in this context. Our results have practical and policy implications for the Ministry of Health Malaysia and healthcare administrators. For increased sustainability of digital health, strategies should focus on strengthening supervisory support, promoting concrete benefits, such as workflow efficiency, and offering the opportunity for hands-on training. The study highlights that successful digital transformation in primary care relies as much on the social and experiential context within healthcare professional teams as it does on the functionality of the systems deployed.

6. CONCLUSION

The findings indicate that social, organizational, and experiential factors have a greater influence on the successful adoption of the Teleprimary Care–Oral Health Clinical Information System (TPC-OHCIS) in Perlis than the technical functionality of the system itself. The findings of this study show that Social Influence, Relative Advantage, and Trialability are significant determinants of healthcare staff's behavioural intention to use the system. Peer support, perceived advantages over existing methods, and opportunities for hands-on experience were found to be more important than perceived ease of use or expected performance benefits in supporting digital healthcare adoption in Malaysian primary care settings. Theoretically, this study extends existing knowledge by demonstrating how the integration of the UTAUT and DOI frameworks provides a more comprehensive understanding of technology acceptance in healthcare settings. From a practical perspective, the findings provide guidance for policymakers, system developers, and healthcare administrators in designing tailored interventions, such as formal training programs and social support initiatives, to improve system utilization. Future research should expand this study to other regions in Malaysia and consider longitudinal or mixed-method approaches to further examine the sustainability of digital health system adoption.

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