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The relationship between transformational leadership and the unified theory of acceptance and use of technology through self-efficacy

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***Abstract*---**The current new-normal era pushed and forced the Primary Health Care Units (PCUs) of Thailand into implementing application technology that resulted in people taking greater control of their health, and improved the efficiency of medical and public health personnel to reduce the demand on health resources while still meeting the health needs of the people. Health-assisted COVID-19 infected patients and high-risk people were monitored using application technology and Telemedicine to identify their symptoms and provide a quick tracking approach that could be used until public health surveillance was completed. This paper aims to explore the role of transformational leadership as a predictor of self-efficacy and the unified theory of acceptance and use of technology. Further, to examine the mediating role of self-efficacy between transformational leadership and the unified theory of acceptance and use of technology, The collected data were derived from 639 staff of Thailand's Primary Health Care units. Structural equation modeling was applied to test the research model hypotheses. The study's findings highlight the significant positive impact of transformational leadership on self-efficacy and the positive effect on the unified theory of acceptance and use of technology. Likewise, self-efficacy proved to be a predictor of the unified theory of acceptance and the use of technology as a mediator in the model. Nevertheless, the primary purpose of this study was to test the theoretically-driven hypotheses and crucial practical implications for organizations. The conclusion concludes by suggesting that organizations should increase employee self-efficacy

with transformational leadership to maximize desired workplace attitudes and behaviors of acceptance and use of technology.

***Keywords*---**primary health care units, acceptance, use technology, Thailand.

Introduction

COVID-19 was initially discovered in Wuhan, China, in December 2019, before spreading over the world. On March 11, 2020, the World Health Organization (WHO) labeled it a pandemic. Everyone on the earth was affected by the Pandemic and its aftermath socially, emotionally, physically, psychologically, and economically. COVID-19 infected patients and high-risk people were able to detect their symptoms thanks to application technology, which also provided a quick tracking mechanism that could be used until public health surveillance was completed. The monitoring of COVID-19 patients using an integrated hospital network was aided by a new application of technology, being a patient and hospital management system. Application technology also aided in the promotion of health, the improvement of patient satisfaction, the reduction of readmission rates, and the expansion of the health resources ecosystem. There has been a global disruption in society and healthcare systems worldwide (McKee & Stuckler, 2020). The Pandemic was managed and controlled in part thanks to mobile technologies. As a result of this increased focus, the number of mobile phone applications developed to counteract COVID-19 has increased. Telemedicine has shown to play an increasingly important role in monitoring patients with diabetes and other chronic diseases, as well as those who have been self-isolating at home and unable to attend clinic visits during the current COVID-19 Pandemic. Due to socio-economic changes and the pandemic crisis faced in Thailand, the policy is administered holistically placing the strategy for implementation.

Primary health care plays a solid foundation in the national health system. The multi-level village health volunteer networks have to "take in charge" their responsibility to strengthen the health care system. They create people aware of themselves in health care as individuals, families, and communities. The Primary Health Care units (PCUs) of Thailand, being the frontline warriors of the pandemic covid-19 crisis, have a high potential. Thailand Ministry of Public Health set up an Emergency Operations Centre on 4 January 2020 to provide daily technical support and advice to the public and the government (Namwat et al., 2020). Currently, the new-normal era working place pushing and forcing the PCUs of Thailand, to implement application technology that has resulted in people taking greater control of their health and medical and public health personnel improving efficiency by reducing the demand on health resources while still meeting the health needs of the people. A new technology-enhanced system for medical field personnel encouraged network participation resulting in the co-creation of a health data center. Application technology and Telemedicine were used to monitor health-assisted COVID-19 infected patients and high-risk people, identify their symptoms and provide a rapid tracking method that could be employed until public health surveillance was completed.

After the pandemic becomes normalized, digital technologies should be crucial to the potential implication of the context related to information systems in the PCU workplace. Services of the PCUs of Thailand recognize the need to undertake new technologies to continue to serve primary health care's mission. Nevertheless, it is not easy and poses many challenges such as the acceptance and adoption of new technologies by staff. Seeking the strategy for the acceptance and use of technology has often been obtained and applied to explain individual technology use. In addition, leadership plays an essential role in enthusiasm for motivation and attitude, and behaviors convincingly shown to positively influence technology acceptance. However, the influence of the leadership styles in this context has not been examined before. The study models test leadership styles, such as transformational leadership (TL), as antecedents influencing the unified theory of acceptance and use of technology (UTAUT).

Moreover, goal-setting, effort investment, persistence in the face of barriers, and recovery from setbacks are trustworthy indicators of employees' self-efficacy (SE). Our studies explored the role of transformational leadership as a predictor of self-efficacy and the unified theory of acceptance and use of technology and further examined the mediating role of self-efficacy between transformational leadership and the unified theory of acceptance and use of technology. In addition, it focuses on the PCU workplace. Investigation of the acceptance and use of technology was determined within specific management parameters. The theoretical foundation exists derived from TL, SE, and UTAUT. These constructs play essential roles in contributing to the PCUs of Thailand, as the conceptual model had created. Thus, the research objectives proposed 1) to explore the role of transformational leadership as a predictor of self-efficacy and the unified theory of acceptance and use of technology 2) to further examine the mediating role of self-efficacy between transformational leadership and the unified theory of acceptance and use of technology.

Literature Review

The role of leadership, enhancement, and inspiration motivation in administration are faced by Thailand's PCUs staff, resulting in productivity. Staff's SE and the UTAUT collectively play a vital role in ensuring that their patients receive care in terms of their services. Acceptance and use of technology and a high level of TL have already been researched, but ignored the indirect effects of SE in the context of the staff of Thailand's PCUs.

To answer research question 1, it has explained the hypothesis: Is there any positive direct effect of TL components related to the UTAUT? Previous research mentioned the related hypotheses and demonstrated evidence as existing. Many kinds of research concerning TL played an essential role in being considered a necessary part of effective management for creating a workplace culture. The TL dimensions are idealized influence, intellectual stimulation, individual consideration, and inspirational motivation, collectively representing social exchange. That constitutes the concerns and respect for the employees and for their managers through which employees prioritize organizational goals. The TL and building trust can enhance employee outcomes because it is recognized that leaders exhibiting behaviors that are not self-centered engender employees' trust

and respect for such leaders and make employees prouder of their organizational role. The TL emphasizes higher motive development and arouses followers' motivation through creating and representing an inspiring vision of the future.

The positive effects of the TL on several organizational outcomes underscore their relevance (Chutchawanchanchanakij, 2017). Meanwhile, these positive effects have been proven in a wide range of applied settings (Thanomton et al., 2018). One leadership style that is particularly effective for alleviating employee stress during organizational change is transformational leadership (Breevaart et al., 2014). Therefore, a focus on transformational leadership has implied its position as the solution to many of the challenges mentioned above, and considered essential for effective management to create a culture of patient safety. Effective leadership by healthcare professionals is vital in modern PCU settings. The primary factor underpinning this is the drive to improve the quality of healthcare provision in a background of ever-increasing healthcare demands and the need for increased efficiency and productivity. Examinations indicate that implementation of transformational leadership adds to an employee's acceptance to change. Besides, the success of change depends upon the organizational members' acceptance to change (Di Fabio & Gori, 2016; Sangperm & Chienwattanasook, 2019).

The UTAUT model proposed by Venkatesh et al. (2003) was used to explain the process of new technology acceptance and use in organizations. The UTAUT model has endeavored to ascertain technology acceptance and use factors. with the core determinants of the behavioral intention of the UTAUT, namely, performance expectancy, effort expectancy, social influence, and facilitating conditions. Paenchan and Kookkaew (2022) used the UTAUT model in their study of purchase decisions made by consumers for food delivery using mobile phone applications. Venkatesh et al. (2003), using the UTAUT theory, posited that the actual usage of technology was swayed by the behavioral intention to use that innovation. In addition, Yosvijit and Nurittamont (2021) asserted that testing the role of technology acceptance as the integrated marketing communication and trust influence on purchasing intention of digital salak through mobile banking customer of government savings bank. The hypothesis posited: the support among latent variables related to the constructs of hypothesis 1. as illustrated in Figure 1.

H1. Transformational leadership (TL) has a positive effect on the theory of acceptance and use of technology (UTAUT).

To answer research question 2: Are there any positively direct and indirect effects from any mediation via SE in the relationship between TL and UTAUT of an individual in the PCUs working place? To encourage the hypothesis, that transformational leaders encourage subordinates to accept the organization's vision, mission, and goals leading to a feeling of belonging. Furthermore, it demonstrated that transformational leaders have the motivating abilities to inspire subordinates to perform above expectations selflessly and challenge the status quo, that leaders increase their followers' efforts. Leadership happens anytime, anywhere, and in any function from successful leaders' behaviors. Transformational leaders can genuinely be seen as change agents, placing the

concern of their healthcare employees above themselves. Rather than toppling resistance to change, transformational leaders acknowledge and deal with it. Moreover, quality improvement initiatives are more likely to succeed if the Primary Health Care workforce believes they have ownership of the task (Shapiro & Rashid, 2011). Leadership behaviors increase followers' self-efficacy and psychological ownership (Kim & Beehr, 2017; Punpromthada et al., 2021). In addition, high degrees of participation and self-improvement result from demonstrating confidence in followers' skills, including them in decision-making, authorizing them to take responsibility for their duties, and reducing bureaucracy through developing open and trusting relationships (Humborstad & Kuvaas, 2013).

Furthermore, the technology adoption literature suggests that social factors like supervisors' support are related to the behavioral intention concerning the acceptance and use of technology (Venkatesh et al., 2003). In the light of these research outcomes, we consider that the TL, providing the SE, enhances application behaviors by improving perceived benefits from the UTAUT. Previous research has shown that transformational leaders have a significant effect on lower turnover rates and increased employee self-efficacy (Caillier, 2014). In addition, self-efficacy also increases employee performance and job satisfaction (Lai & Chen, 2012). Cavazotte et al. (2013) revealed that transformational leadership affected by self-efficacy could significantly improve performance. As mentioned above, it leads to the hypothesis posited: describes the support for latent variables related to the constructs of hypotheses 2, 3, and 4. as illustrated in Figure 1.

H2. There is a positive effect of transformational leadership (TL) on self-efficacy (SE).

H3. Self-efficacy (SE) positively affects the theory of acceptance and use of technology (UTAUT).

H4. Self-efficacy (SE) mediates the relationship between transformational leadership (TL) and the theory of acceptance and use of technology (UTAUT).

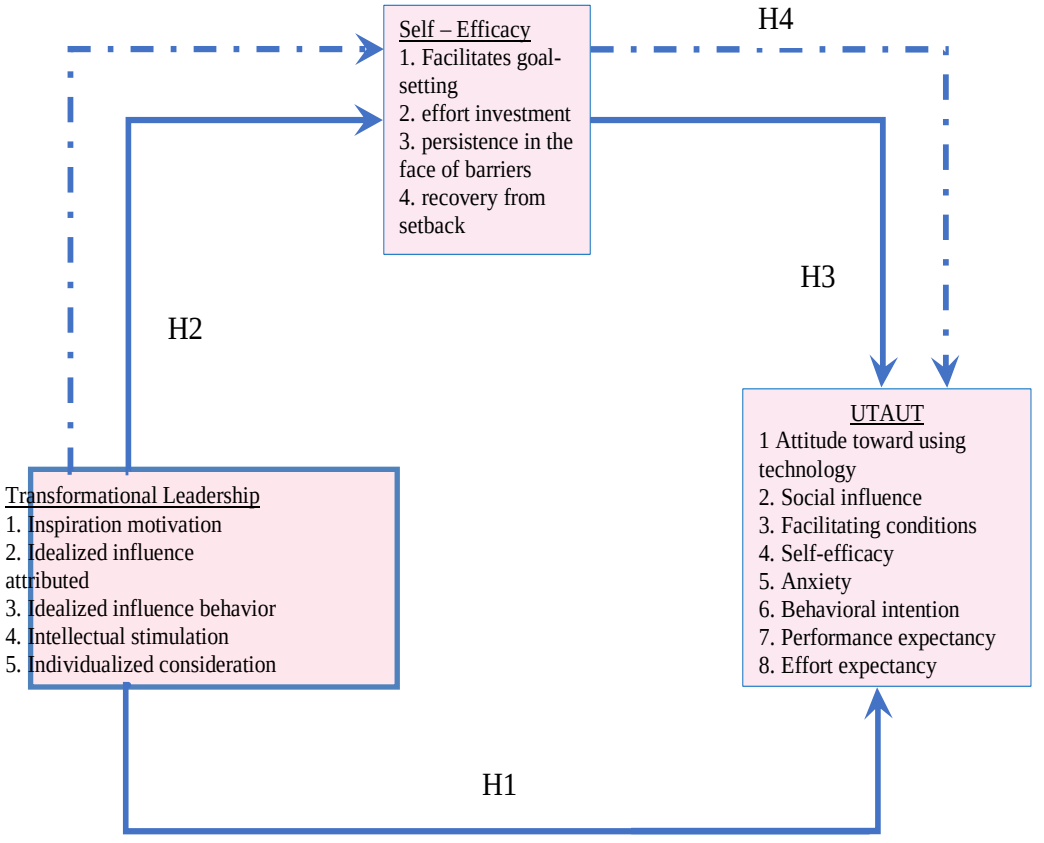

Figure 1. Conceptual framework

Research Methodology

Data collection

Data for this study were collected from several of the PCUs staff in Thailand. Researchers invited 98 of 426 locations throughout the country. An electronic mail survey questionnaire offered development of data collection with sampling populations dispersed over a wide geographic area while reducing social desirability bias. From a total of 1000 questionnaires administered to the potential respondents; 639 returned completed questionnaires, giving a response rate of 63.9% and starting with the data screening process.

Measures

The predictor variables used in the present study were transformational leadership and self-efficacy. The outcome variables were the unified theory of acceptance and use of technology. Employees' agreement on each statement were assessed on a Likert scale ranging from (1) strongly disagree to (7) strongly agree.

Transformational leadership. We used nine high-loading items from the multifactor leadership questionnaire (MLQ) Form 5X of Avolio et al. (1999) to measure Inspirational motivation (IM), Idealized influence attributed (IIa), Idealized influence behaviors (IIb), Intellectual stimulation (IS), and Individualized consideration (IC). These are trustworthy for the assessment of transformational leadership. The reliabilities for the total items and each leadership factor scale were generally high, ranging between .74 and .94, as underpinned above.

Self-Efficacy; The General Self- Efficacy Scale (GSE), assessment by Schwarzer and Jerusalem (1995), is based on social cognitive theory. The survey questionnaire comprises 10 questions, of which the scale of Cronbach's alpha is .928. Therefore, it could summarize that the investigation assessment facilitated goal-setting, effort investment, persistence in the face of barriers, and recovery from setbacks. These are trustworthy for the evaluation of self-efficacy factors.

The Unified Theory of Acceptance and Use of Technology (UTAUT) obtained was formulated with four core determinants of intention and usage; the survey data comprises 24 questions, of which the scale of the Cronbach's alpha is .846. Therefore, it could be summarized that it was assessed using the UTAUT comprising performance expectancy, effort expectancy, social influence, facilitating conditions, self-efficacy, anxiety, and attitude toward using technology. The research instrument was based on the original survey instrument described by Venkatesh et al. (2003), which is trustworthy for assessing constructs of UTAUT.

Research Results

Descriptive statistics

Table 1 shows the descriptive nature of statistics consisting of the mean and standard deviation among the variables applied by the SPSS 26 statistical computer software package to assess the data. In addition, AMOS 26 was used to assess the data for SEM that has been used to examine the mediating role analysis in this study. Confirmatory factor analysis (CFA) confirmed each factor's constructs. The model fit indices were suitable to run the CFA analysis. It was reported that all the values were within the acceptable threshold limits (x 2 /df = 1.993, goodness-of-fit index (GFI) = 0.930, adjusted goodness-of-fit index (AGFI) = .908, normed fit index (NFI) = .941, comparative fit index (CFI) = .970, and root mean square error of approximation (RMSEA) = .039). The acceptance criteria values of GFI, AGFI, and NFI were beyond .9. Meanwhile, it indicated a good model fit; the RMSEA value below .05 showed an excellent model fit (Hair et al., 2014). This model fit indices were suitable to run the CFA analysis.

Table 1. The descriptive statistics analysis; Mean, standard deviation (S.D.) among variables

Exogenous & Endogenous Variable	N	Cronbach's Alpha	Mean	Variance	Std. Deviation	No. of Items

Transformational leadership (TL)	63 9	.894	34.89 3	23.073	4.803	9
UTAUT	63 9	.907	46.95 1	43.253	6.576	13
Self - Efficacy (SE)	63 9	.921	34.08 6	26.950	5.191	10

The factor loadings were more significant than .6. Besides, all value scales of average variance extracted (AVE) of thirty-two items are more than .5. The reported correlation values among all the construct variables confirm high convergent validity (Hair et al., 2014) Hence, the result shows the excellent adaptability of the model, as shown in Table 2.

Table 2. The constructs evaluation and convergent validity analysis.

	Items (n)	λ	λ^2	*Var. (δ)*	AVE	CR
F1 (TL)	IM1	.798	.637	.363	.631	.938
	IM2	.893	.797	.203		
	Iia1	.751	.564	.436		
	Iia2	.642	.412	.588		
	IIb2	.646	.417	.583		
	IS1	.845	.714	.286		
	IS2	.869	.755	.245		
	IC1	.851	.724	.276		
	IC2	.811	.658	.342		
F2 (SE)	SE1	.755	.570	.430	.551	.924
	SE2	.695	.483	.517		
	SE3	.757	.573	.427		
	SE4	.741	.549	.451		
	SE5	.790	.624	.376		
	SE6	.799	.638	.362		
	SE7	.662	.438	.562		
	SE8	.761	.579	.421		
	SE9	.697	.486	.514		
	SE10	.752	.566	.434		
F3 (TA)	PE1	.834	.696	.304	.654	.961
	PE2	.900	.810	.190		
	PE3	.822	.676	.324		
	EE1	.868	.753	.247		
	EE3	.872	.760	.240		
	EE4	.732	.536	.464		
	AT2	.791	.626	.374		
	AT3	.838	.702	.2980		
	SI1	.654	.428	.572		
	SI2	.832	.692	.308		
	SI3	.794	.630	.370		

	SEF1	.712	.507	.493
	SEF2	.826	.682	.318
	PE1	.834	.696	.304

Next, the root of each independent and dependent construct's AVEs were determined to check the discriminant validity. As displayed in Table 3, the values were higher than the correlations among the constructs, confirming high discriminant validity (Hair et al., 2014).

Table 3. The constructs evaluation and convergent validity analysis

Exogenous & Endogenous Variable	CR Composite reliability	TA	UTAUT	SE
TL	.938	**.631**		
UTAUT	.961	.544	**.654**	
SE	.924	.662	.400	**.551**

Note: Bold numbers in the diagonal are AVE, and off-diagonal numbers are squared correlation coefficients

Hypotheses testing

This investigation used SEM to test all the hypotheses developed during the literature review to determine which model could be used to test the hypotheses. As well as guidelines, several nested SEMs continued to be used to establish which model better fit the data. The mediated model emerged as a better fit for the data (see Figure 2 and Table 4). The standardized total, direct and indirect effect tables were extracted from the mediated model to establish whether a mediation effect existed for SE fit on the transformational leadership; the UTAUT has the association (Table 5). These results supported the study hypotheses (see both Tables 4 and 5).

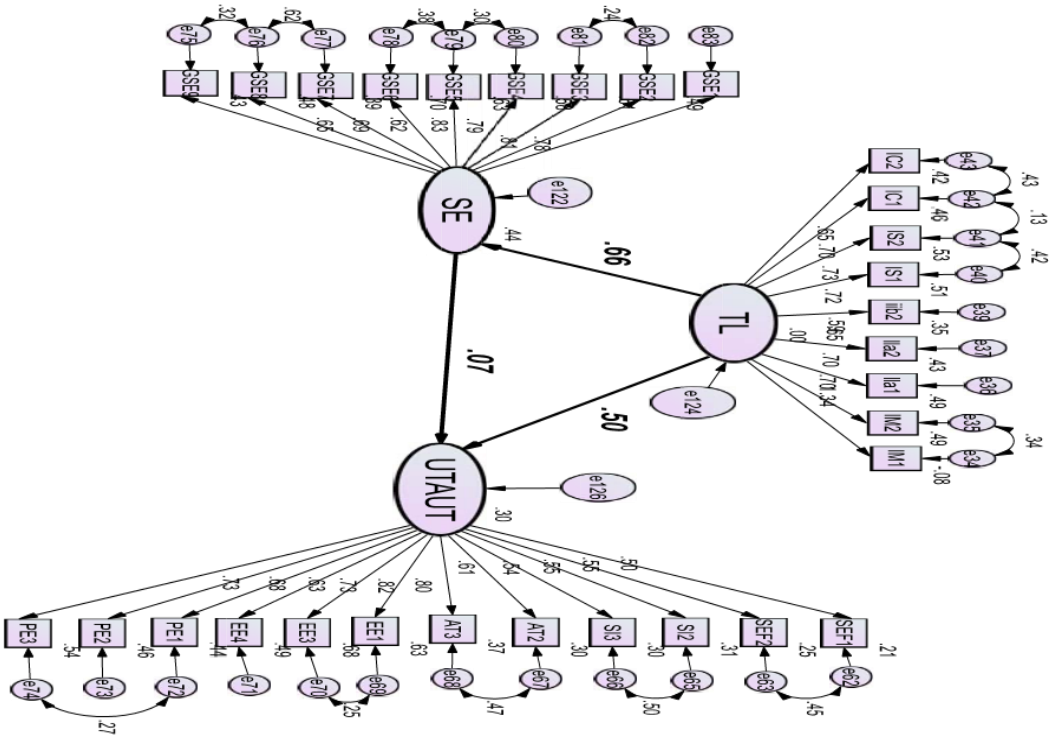

Figure 2. Illustration of statistical analysis results

H1 sought to establish whether the TL, was positively related to the UTAUT has the association. Results in Table 4 indicate that the TL is a significant predictor of UTAUT (β = .498, p < .001). For *H2* the results indicate TL as a significant predictor of SE (β = .662, p > .001). Hence *H2* is supported. In addition, *H3* sought to examine the SE – the UTAUT relationship. Results from study (β = .070, p < 0.024) show that the SE significantly and positively predicts the UTAUT fit. Hence H3 is supported. Lastly, *H4* sought the mediation effect of the SE fit on the TL–the UTAUT relationship. Results (Total Effect = .544; Direct Effect = .498; Indirect Effect = .046) indicate that a mediation effect exists (Hair et al., 2010). But the TL is potentially predictive of the UTAUT (β = .498, p < .001) (Table 4) indicating a full mediation exists on the TL–the UTAUT relationship. The results indicate that *H4* is supported. This model yielded a good fit to the data (see Table 5). Models obtained were compared using the chi-square difference test.

Table 4. The result of the mediator role of self-efficacy.

Construct	Model					
	Transformational leadership (TL)			Self-Efficacy (SE)		
	DE	IE	TE	DE	IE	TE
Self-Efficacy (SE)	.662***	-	.662***	-	-	-
UTAUT	.498***	.046***	.544***	.070*	-	.070*

significance level: **P*-value < 0.05, ***p*-value < 0.01, ****p*-value < 0.001

Table 5. Summary of criteria of good fit to the data parameters for model fit analysis

statistic GOF index	the statistic value	threshold/ fit criterion
CMIN, $\chi 2$	808.409	p>0.05
$\chi 2$ / CMIN or CMIN/DF,	2.303	less than 5.0
RMR	.090	be small is 0.5 or less
GFI	.925	more than .9
AGFI	.925	more than .9
PGFI.	.698	more than .5
NFI	.937	more than .90
CFI	.963	more than .90
TLI	.954	more than .90
RMSEA	.045	a value less than .05

The following results of assessment among the hypotheses have drawn from aims to explore the role of transformational leadership as a predictor of self-efficacy, and the unified theory of acceptance and use of technology and further examines the mediating role of self-efficacy between transformational leadership and the unified theory of acceptance and use of technology; the study is summarized in Table 6.

Table. 6 The results of among hypothesis assessment

Hypothesis	Path	β	*p*-value	Results
H1	UTAUT< --- TL	.498	.000***	Supported
H2	SE < --- TL	.662	.000***	Supported
H3	UTAUT< --- SE	.070	.024*	Supported
H4	UTAUT < ---SE< --- TL	.046	.000***	Supported

significance level: **P*-value < .05, ***p*-value < .01, ****p*-value < .001

Discussion and Conclusion

Discussion

The findings of this study indicate that transformational leadership is a significant predictor of the unified theory of acceptance and use of technology association, as was hypothesized (H1). This finding supports previous studies concerning transformational leadership to predict the unified theory of acceptance and use of technology (Sangperm & Chienwattanasook, 2019; Venkatesh et al., 2003). Transformational leadership improves the skills and knowledge of employees, performance expectancy, effort expectancy, social influence, facilitating conditions, self-efficacy, anxiety, and attitude toward using technology thereby sending them a positive signal; these are trustworthy for assessing constructs of UTAUT.

In addition, the results indicated that transformational leadership is a strong predictor of self-efficacy (H2). Workplace transformational leadership enhances employees' support and motivation alters their behavior and leads them to go the extra mile. Transformational leadership is inspirational motivation, idealized influence attributed to idealized influence behaviors, intellectual stimulation, and individualized consideration to create a reciprocal relationship. Employees are more likely to help the leadership in return for what the organization does for them. In the present study, individuals working in the Primary Health Care unit's organizations are involved in high self-efficacy, which is essential for enhancing their professional skills. These resulted in more excellent trustworthiness that facilitated goal-setting, effort investment, persistence in the face of barriers, and recovery from setbacks. Therefore, this finding is consistent with the theory that the Primary Health Care unit's staff self-efficacy trustworthiness with transformational leadership enhances employees' support initiatives tending to resist less and exhibit positive behaviors. According to our expectations, the findings revealed that self-efficacy directly affects the unified theory of acceptance and use of technology (UTAUT) (H3).

The study found a mediating role for self-efficacy between transformational leadership and the unified theory of acceptance and use of technology (H4). There is consistency with the few previous studies that reported solid ties between self-efficacy and UTAUT. Based on the UTAUT model, performance expectancy and effort expectancy predict the user's behavioral intention about using a technology, where: performance expectancy is the degree of relative benefit in terms of conducting operations, processing information and needs, and gathering advanced reports; and effort expectancy is the degree of ease when using the technology (Venkatesh et al., 2003). Furthermore, Cavazotte et al. (2013) support that transformational leadership provides inspirational motivation and individualized consideration to employees and always supports their employees' self-efficacy beliefs for enterprise system use, and being affected by self-efficacy can significantly improve performance.

Theoretical implications

From a theoretical perspective, this study attempts to contribute to transformational leadership in organizations by maximizing employees' self-efficacy with skill development activities to adopt acceptance and use of technology in the workplace literature, according to the suggestion made by the research of Cavazotte et al. (2013); Caillier (2014); Kim and Beehr (2017). Self-efficacy is a significant factor that plays a crucial role in enhancing application behaviors by improving perceived benefits from the UTAUT. Thereby, effective leadership by healthcare professionals is vital in modern Primary Health Care units (PCUs) settings. No previous study could empirically examine the impact of self-efficacy on the unified theory of acceptance and use of technology (UTAUT). The present study fills the void in this area. It adds value to the existing knowledge about transformational leadership in organizations to maximize employees' self-efficacy to accept and use technology in the workplace.

Practical Implications

The Primary Health Care Units organizations should prioritize employee self-efficacy with transformational leadership to achieve desirable workplace attitudes and behaviors, acceptance, and use of technology. Therefore, transformational leadership practitioners should revise how they measure the self-efficacy of their acceptance and use of technology activities. In addition, they should consider employees' feelings and experiences concerning their leadership and the organization's supported training acceptance and use of technology and development efforts. In other words, the acceptance and use of technology should be an integral part of transformational leadership in organizations to maximize employees' self-efficacy with skill development activities.

Conclusion

Research findings indicate that transformational leadership positively affects the unified theory of acceptance and use of technology and can significantly increase self-efficacy. Acceptance and use of technology activities comprising performance expectancy, effort expectancy, social influence, facilitating conditions, Self-efficacy, anxiety, attitude toward using technology, and skill and knowledge enhancement activities are essential prerequisites in the pursuit of positive behavioral outcomes in the Primary Health Care unit’s workplace. Self-efficacy has been affirmed and proved to predict turnover intention and a mediator in the model. The present study contributes to our understanding of the causal links between transformational leadership, self-efficacy, and the unified theory of acceptance and use of technology. The study indicates that transformational leadership positively and significantly influences the unified theory of acceptance and use of technology. The findings suggest a direct relationship between self-efficacy and the unified theory of acceptance and use of technology. Also, self-efficacy was positively a significant mediator in the present study. Moreover, the relationship between transformational leadership and the unified theory of acceptance and use of technology has rarely been investigated. Hence, the study results indicate strong ties between transformational leadership, self-efficacy, and the unified theory of acceptance and use of technology, thus marking the study as a significant theoretical contribution to the literature. These findings open a new path for future research, thus representing an essential contribution to the present study.

Limitations

A few aspects limit the scope of this paper. First, the findings of this study is based on a sample of only the PCUs in Thailand during the COVID-19 pandemic. They may not fully represent all Public Health organizations of other countries. Second, the present study is cross-sectional and solely focused on the PCUs of Thailand organizations. As discussed earlier, the PCUs are known for their oriented culture and some similar approaches where most of the tasks stay fixed and the nature of work does not frequently change in the workspace. Hence, the responses collected from the staff working in the same section may limit the generalization of the findings.

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