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Unraveling the predictors of research utilization among Thai educators: evidence from PLS-SEM analysis

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ABSTRACT

This groundbreaking study unveils critical factors driving research utilization (RU) among Thai educators, offering vital insights for educational policymakers and administrators. Employing an advanced partial least squares structural equation modeling (PLS-SEM) approach, we examined data from 688 teachers under the office of the basic education commission. Our findings reveal a complex interplay of factors influencing RU, with organizational support (SUPP) emerging as the most potent driver (beta=0.570), followed by knowledge and research skills (KNOWS) (beta=0.539), organizational leadership (LEAD) (beta=0.472), and attributes of research (ATTR) (beta=0.391). Interestingly, ATTR showed the highest direct effect (DE) (beta=0.391), while LEAD had the strongest indirect impact (beta=0.429). Surprisingly, organizational climate (ORGA) showed no significant effect, challenging conventional wisdom. The study explains 52.5% of the variance in RU, providing a robust foundation for evidence-based educational reforms. Delve into our analysis to discover how these relationships between knowledge, leadership, and organizational dynamics shape educational RU in Thailand, and explore our recommendations for enhancing research integration in educational practices.

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1. INTRODUCTION

Research utilization (RU) is the systematic and reliable application of knowledge, methods, or findings from systematic inquiry, to improve and enhance existing practices, both directly and indirectly, across various disciplines [1]. It plays a pivotal role in driving a knowledge-based society and cultivating a culture of reasoning among individuals. Amidst a changing world that demands human resources with analytical thinking skills and high-level competencies, RU becomes crucial [2]. As a dynamic world characterized by rapid advancements, individuals and societies must continuously adapt to stay abreast of evolving trends and challenges [3]. Reasoned utilization that provides moderate and trustworthy information becomes crucial. It helps ensure that processes confronting change can manage risks and instill confidence that increased development efforts will lead to maximum efficiency [4]. Conversely, inadequate effective methodologies can lead to developmental risks and unfortunate missed competitive opportunities. Therefore, decision-making supported by credible and relevant research findings ultimately leads to the selection of the most accurate, appropriate, and valuable new directions [5].

The practical application of research has consistently garnered attention. It began with the recognition of the importance of utilizing research knowledge to address societal needs [6]. Research has

been acknowledged as a valuable source of knowledge capable of solving real-world problems, particularly in fields like medicine and nursing, where the primary objective is to enhance operational efficiency [7], [8]. However, during the early stages, personnel lacked accurate and sufficient research knowledge, prompting efforts to develop greater research competencies and skills. This initiative led to the emergence of the evidence-based practice concept, which emphasizes professional decision-making grounded in empirical evidence [9]. It marked the beginning of an expansion of research into more in-depth applications of RU. Subsequent studies have categorized RU into three main types: instrumental research utilization (IRU), conceptual research utilization (CRU), and persuasive research utilization (PRU) [1]. These categories have been refined from the overall study of RU in various contexts [4]. Nevertheless, RU remains an essential variable in the social sciences that lacks a clear theoretical definition, necessitating continuous data-driven studies to further advance this area [10].

Thailand has consistently emphasized RU through national policy formulation, budget allocation to relevant agencies, and a particular focus on education. This is aimed at fostering quality education management that will have a long-term impact on RU across all sectors of the country [11]. As education is the foundation for human resource development, which serves as a driving force for national development [12], it is crucial to ensure that education can effectively generate positive outcomes. These include developing educational management strategies aligned with the rapidly changing world, designing learner-centered curricula and learning activities, fostering teaching methods that promote higher-order thinking skills among learners, adopting realistic assessment and evaluation methods, and enhancing learner potential. RU in education development can ensure the quality of these processes [13]. However, an ineffective approach to these processes could hinder educational development, leading to outdated curricula that are not aligned with learner needs, a lack of essential 21st century skills among learners, and reduced national competitiveness [14]. This could manifest as a lack of advanced knowledge and skills among personnel, a dearth of innovation, and limited research on RU in Thailand, particularly in basic education. With limited studies on RU in basic education, achieving effective implementation of the aforementioned processes is challenging due to the lack of clear guidelines. Therefore, this research aims to investigate the factors influencing RU among teachers under the office of the basic education commission, who are key components of the aforementioned education management.

The promotion of RU in education has garnered significant attention both in Thailand and globally, with four key factors influencing the adoption of research findings: i) individual factors, such as teachers' knowledge and research skills (KNOWS) [15]; ii) organizational factors, including support from school administrators [16]; iii) the characteristics of the research itself [17]; and iv) channels for disseminating research results [18]. However, many teachers still hold negative attitudes toward conducting and applying research, such as perceiving teaching and research as separate processes, viewing research as overly complex and beyond their responsibilities, or fearing failure in conducting research [19], [20]. These attitudes pose significant barriers to effectively utilizing research to improve teaching and learning. In Thailand, there are notable examples of RU in education, such as integrating research on active learning into instructional design or applying educational technology research to develop online learning platforms for students in remote areas [4]. Internationally, case studies highlight the use of neuroscience research in designing curricula that align with children's brain development [3] or applying artificial intelligence research to develop adaptive learning systems that meet learners' personalized needs [4]. Understanding and addressing these negative attitudes is therefore crucial in promoting RU in the field of education.

Given the complexity of factors influencing RU in education, this study employs partial least squares structural equation modeling (PLS-SEM), using a formative measurement model and the disjoint 2-stage approach. This method is particularly suitable as it effectively manages the intricacies of multiple interrelated latent variables, such as analyzing how organizational factors influence teachers' RU. Furthermore, it allows for precise estimation of the impact of various variables, which will lead to effective policy recommendations for administrators, teachers, and scholars. These recommendations may include developing research support systems in schools, designing research skills development programs for teachers, and creating platforms that link research with classroom practice. The findings from this analysis will provide a deeper understanding of the mechanisms driving RU among Thai teachers, which will ultimately contribute to enhancing the quality of Thai education through effective and sustainable RU, grounded in empirical evidence.

2. METHOD

2.1. Sample

The research sample consisted of 688 teachers affiliated with the office of the basic education commission in the Northern Region of Thailand, categorized into 520 primary school teachers and 168 secondary school teachers. The sample was obtained through a multi-stage sampling method based on the

population proportions at each educational level to ensure the inclusion of schools and teachers from each level in sequence. The minimum sample size was determined using the parameter estimation method, which included an effect size (f^2) of 0.25, a statistical power of 0.8, 8 construct variables, and 30 observed variables, with a 99% confidence level allowing for a margin of error of ±1% [10], [21]. The minimum sample size required was 336 individuals. The sample size used in this research exceeded the minimum requirement by more than double, ensuring that the sample adequately reflected the similarities and differences within the population, thereby enhancing the accuracy of parameter estimations and preventing inadequate statistical power [10].

2.2. Research instruments

The research instrument used was a questionnaire with 101 items, utilizing a 5-point Likert scale (5=strongly agree/most frequently practiced, 1=strongly disagree/least frequently practiced). This instrument assessed RU through three components: IRU, CRU, and PRU. Additionally, it included five factors influencing RU: organizational leadership (LEAD), organizational support (SUPP), organizational climate (ORGA), KNOWS, and attributes of research (ATTR). The scope of measurement was defined by operational definitions.

RU refers to the process by which teachers implement research findings and methodologies to their practices, aiming to develop or change approaches and ideas to achieve better results. It consists of three components: i) IRU: the use of research findings and research methods by teachers in performing their duties, learning management, and relationships with parents and the community. It is measured by three indicators: teacher performance (IRU1), learning management (IRU2), and community relationships (IRU3); ii) CRU: the use of research findings and research methods by teachers to spark reasoning, raise awareness, change existing concepts, and generate new ideas in order to develop themselves in line with the standards of knowledge and professional experience of teachers. It is measured by four indicators: reasoning (CRU1), awareness (CRU2), change of concepts (CRU3), and creating new ideas (CRU4); and iii) PRU: the use of research findings and research methods by teachers to persuade and convince administrators, supervisors, and colleagues to change their thinking and practices in line with research findings. It is measured by two indicators: persuasion to change ideas (PRU1) and persuasion to change practice (PRU2).

The questionnaire comprises 34 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.686 to 0.848. An independent samples t-test, considering the top and bottom 27% groups (each with 46 individuals), showed values ranging from 7.704 to 14.131, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.946 to 0.958. The sample questions included: "I apply a variety of teaching techniques from research to suit the different learning styles of my students," "using research results has given me a correct understanding of student development," and "I clearly demonstrate the positive outcomes of using research in curriculum design, student development, and parent collaboration."

LEAD refers to the context in which administrators use their authority to motivate, support, and facilitate teachers, fostering organizational, personnel, and outcome improvements. It is measured by four observed variables: idealized influence (IDEA), intellectual stimulation (INTE), individualized consideration (INDI), and inspirational motivation (INSP). The questionnaire comprises 12 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.691 to 0.891. An independent samples t-test, considering the top and bottom 27% groups (each with 46 participants), showed values ranging from 6.161 to 10.853, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.873 to 0.924. The sample questions included: "the school principal encourages me to constantly look for new ways to work, develop, and solve problems," "my school principal has a clear and actionable vision and direction," and "my school principal asks about and creates opportunities for professional development that are tailored to the interests of all teachers."

SUPP refers to the support teachers receive related to research, including assistance with research resources, allocation of appropriate time, research training, guidance, feedback, and collaboration from experts within their affiliated organizations. It is measured by three observed variables: resources for research (RESO), knowledge for research (KNOW), and time for research (TIME). The questionnaire comprises 9 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.676 to 0.878. An independent samples t-test, considering the top and bottom 27% groups (each with 46 participants), showed values ranging from 7.199 to 12.455, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.862 to 0.906. The sample questions include: "I receive support with materials and equipment for teaching management to develop and solve student problems," "I can use the school facilities as a resource for studying and developing my classroom research at any time," and "when I have questions about conducting classroom research, I can find answers from personnel in the school or affiliated organizations."

ORGA refers to the perception of interactions between teachers and the organizational regulations, including friendliness, responsibility, and fairness. It is measured by four observed variables: rules (RULE), friendliness (FRIEN), responsibility (RESP), and fairness (FAIR). The questionnaire comprises 14 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.704 to 0.863. An independent samples t-test, considering the top and bottom 27% groups (each with 46 participants), showed values ranging from 9.356 to 12.684, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.880 to 0.908. The sample questions include: "my school clearly defines roles and grants rights to practitioners," "I feel that I am an important part of the school," and "I receive equal opportunities and treatment from the school as all other teachers."

KNOWS refers to teachers' perception of their knowledge and abilities in problem-solving, information seeking, research methodology, statistical data analysis, and research dissemination. It is measured by five observed variables: problem solving skills (PROB), information seeking skills (INFO), research methodology skills (RESM), data management and analysis skills (STAT), and research publicizing skills (COMM). The questionnaire comprises 17 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.704 to 0.894. An independent samples t-test, considering the top and bottom 27% groups (each with 46 participants), showed values ranging from 9.112 to 12.314, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.862 to 0.939. The sample questions include: "I can systematically design problem-solving methods," "I often find research on the topics I need in a short time using various search techniques," and "I can design research frameworks that align with the problems identified."

ATTR refer to teachers' perceptions regarding the usefulness, compatibility with their work, complexity, repeatability, and observable benefits of conducting and utilizing research. It is measured by five observed variables: relative advantage (ADVA), compatibility (COMPA), complexity (COMPL), trialability (TRAI), and observability (OBSE). The questionnaire comprises 15 items, with discrimination power assessed through item-total correlation (r_{xy}) values ranging from 0.416 to 0.861. The independent samples t-test, considering the top and bottom 27% groups (each with 46 participants), showed values ranging from 5.658 to 10.852, all statistically significant at the 0.01 level. Cronbach's alpha for the observed variables ranged from 0.726 to 0.929. The sample questions include: "I conduct research based on current practices such as goals, available resources, and involved personnel," "I focus on studying and researching issues rather than complex methodologies," and "I am interested in research that can be tested on a small scale of actual practice."

2.3 Analyzing of data

This research involves the analysis of multivariate data where the variables are interrelated in a causal factor manner. The researcher employed PLS-SEM [10], using the PLS algorithm for parameter estimation and bootstrapping (5,000 replications) to obtain path coefficients with statistical significance testing. The hypothesized model in this study is a higher-order structural model, where highly abstract constructs are specified as higher-order and more concrete components as lower-order constructs. This reduces the structural complexity of the model and multicollinearity. Both levels of constructs were measured using a formative-formative measurement model [22]. The analysis of these higher-order constructs was conducted using the disjoint 2-stage approach [23] with the ADANCO version 2.3.2 software.

The analysis of higher-order constructs using the disjoint 2-stage approach is conducted in two stages. The first stage analyzes the lower-order constructs, where independent variables are directly examining the relationship between with the lower-order constructs to obtain their standardized construct scores. In the second stage, the analysis of the higher-order constructs is carried out by using the standardized construct scores of the lower-order constructs as indicators for the newly created higher-order constructs. The independent variables are then analyzed in relation to the newly created higher-order constructs in the same manner as in the analysis of the lower-order constructs [23].

For model evaluation, three aspects are considered: i) overall model fit: this involves parameter estimation to assess the differences between the observed value or approximated value and the predicted value of the dependent variables. Nomological validity is considered, which includes standardized root mean square residual (SRMR), geodesic discrepancy (d_G), and unweighted least squares discrepancy (d_{ULS}), and these should be less than the 99% confidence interval (HI99). However, if all three values exceed this threshold, SRMR should be less than 0.08; ii) outer model or measurement model: this involves examining the quality of the indicators in the model. Given that this research employs a formative measurement model, multicollinearity is evaluated by ensuring that the variance inflation factor (VIF) value is less than 5.0 [24], Additionally, if the VIF value is below 3.3, it indicates that the indicators are free from common method bias (CMB) [25]. The significance of the weight values is assessed by ensuring that the T-weight is greater than 1.96. If statistical significance is not established, loadings greater than 0.5 are considered [26]; and iii) inner model or structural model: this involves examining the influence of variables within the model. The statistical

significance of path coefficients (beta) is assessed [27]. The coefficient of determination (R^2) is evaluated with thresholds of 0.25, 0.50, and 0.75, corresponding to small, medium, and large, respectively [24]. The effect size (f^2) for each path is assessed with thresholds of 0.02, 0.15, and 0.35 for small, medium, and large effects, respectively.

3. RESULTS AND DISCUSSION

For the analysis of the PLS-SEM, the disjoint 2-stage approach involves completing the analysis of the lower-order constructs and then using the standardized construct scores of the components in the subsequent second-stage analysis.

3.1. Overall model fit

The results of the parameters used to examine the nomological validity of the lower-order constructs include SRMR=0.035, d_{ULS}=0.563, and d_G=0.338. These results indicate that the hypothesized model has good fit, as evidenced by the SRMR value being less than 0.08. For the higher-order constructs model, the SRMR=0.038, d_{ULS}=0.440, and d_G=0.254 values similarly indicate good fit for the hypothesized model, as shown in Table 1.

Table 1. Assessing of the goodness of fit of the lower-order and higher-order construct

Parameter		Value	HI95	HI99
Lower-order construct	SRMR	0.035	0.022	0.024
	d_{ULS}	0.563	0.214	0.260
	d_G	0.338	0.212	0.234
Higher-order construct	SRMR	0.038	0.022	0.025
	d_{ULS}	0.440	0.141	0.180
	d_G	0.254	0.137	0.151

3.2. Measurement model

The results of the first stage, as shown in Figure 1, the analysis of the indicator weights of the lower-order construct showed values ranging from 0.146 to 0.533, with statistical significance at the 0.05 level. The highest weights were found in PRU1 (0.533), PRU2 (0.520), and CRU1 (0.476), respectively. The indicator with the lowest weight was STAT (0.146). However, the indicators IDEA, COMPL, and CRU2 were not statistically significant (T-Weight<1.96). Nevertheless, when considering the loading values, the indicators IDEA, COMPL, and CRU2 had values of 0.894, 0.819, and 0.787, respectively, which are above the threshold of 0.5. The multicollinearity analysis showed that the VIF values of the indicators ranged from 1.766 to 4.277, all below 5.0, indicating that there is no multicollinearity among these indicators. Therefore, all indicators can be used as indicators in the lower-order construct.

Second stage, as shown in Figure 2, shows that the independent variables retained the same indicators and structures but the standardized construct scores of IRU, CRU, and PRU from the first stage were used as indicators for the newly constructed variable, RU. The weights in this stage differed slightly from the first stage, ranging from 0.146 to 0.493, with statistical significance at the 0.05 level. The indicators with the highest weights were PRU (0.493), RULE (0.436), and KNOWL (0.432), respectively. The indicator with the lowest weight was STAT (0.146). However, the IDEA and COMPL indicators were not statistically significant (T-Weight<1.96). When considering the loading values, the IDEA and COMPL indicators had values of 0.897 and 0.818, respectively, thus meeting the criteria. The multicollinearity analysis of the IRU, CRU, and PRU indicators, the VIF values were 2.897, 2.633, and 2.740, respectively, as shown in Table 2.

3.3. Structural model

The results of the path coefficients analysis, as in Table 3, indicates that direct effect (DE) reveal significant positive effect of ATTR and SUPP on RU at the 0.01 level. ORGA and LEAD, on the other hand, had no effect on RU. The effect sizes (f^2) of ATTR (0.059) and SUPP (0.021) are small, whereas KNOWS (0.016) and LEAD (0.001) are considered negligible due to their values being less than 0.02. Moreover, KNOWS and SUPP were found to have a statistically significant positive effect on ATTR at the 0.01 level, with a large effect size (f^2) for KNOWS (1.996) and a small effect size for SUPP (0.026). SUPP also had a statistically significant positive effect on KNOWS at the 0.01 level, with a large effect size (0.873). Additionally, SUPP and LEAD were found to have a statistically significant positive effect on ORGA at the 0.01 level. SUPP had a large effect size (0.392), while LEAD had a small effect size (0.140). Lastly, LEAD also had a statistically significant positive effect on SUPP at the 0.01 level, with a large effect size (1.516).

For indirect effect (IE), it was found that KNOWS, SUPP, and LEAD had a statistically significant positive effect on RU at the 0.01 level. Both SUPP and LEAD also had a statistically significant positive effect on ATTR at the 0.01 level, and LEAD had a statistically significant positive effect on KNOWS and SUPP at the 0.01 level.

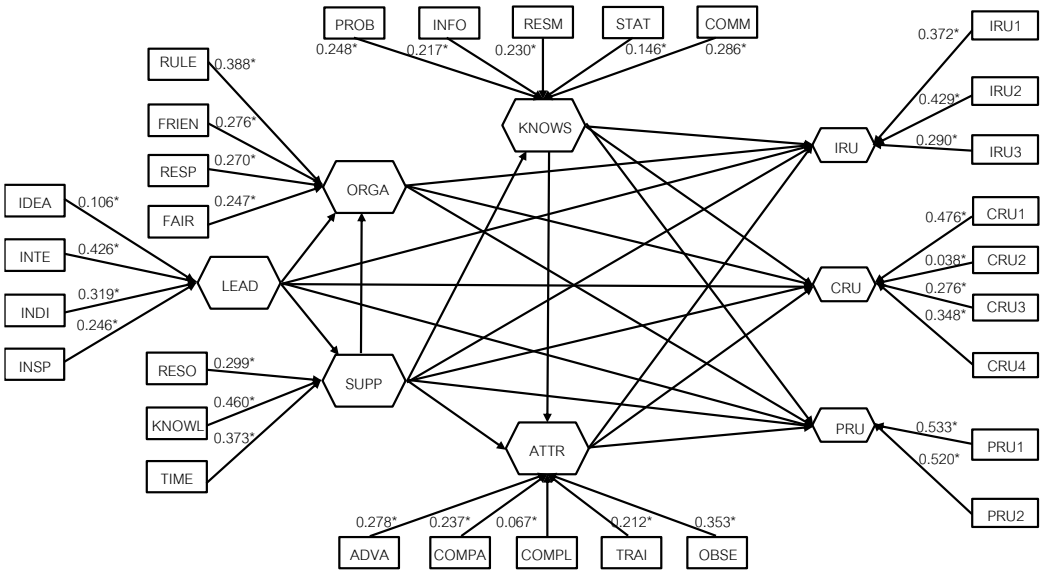

Figure 1. First stage: analysis of lower-order construct

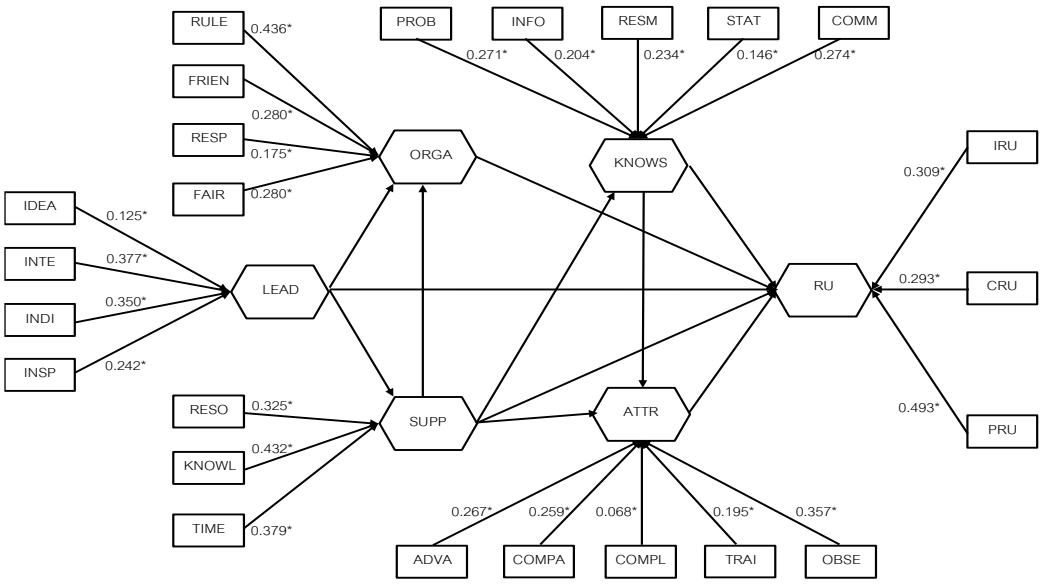

Figure 2. Second stage: analysis of higher-order construct

Considering total effect (TE) of all factors in the structural model, SUPP (beta=0.570) had the highest effect on RU, followed by KNOWS (beta=0.539), LEAD (beta=0.472), and ATTR (beta=0.391), all of which were statistically significant at the 0.01 level. Collectively, all variables explained a moderate level (R^2_{adj}=0.525) of the variance in RU. In the case of ATTR, KNOWS (beta=0.834) had the highest effect, followed by SUPP (beta=0.665) and LEAD (beta=0.516), all of which were statistically significant at the 0.01 level. Together, these variables explained a very high level (R^2_{adj}=0.813) of the variance in ATTR. SUPP (beta=0.683) and LEAD (beta=0.530) had statistically significant positive effects on KNOWS at the 0.01 level, explaining a moderate level (R^2_{adj}=0.465) of variance in KNOWS. Furthermore, LEAD (beta=0.757) and SUPP (beta=0.551)

had statistically significant positive effects on ORGA at the 0.01 level, explaining a high level (R^2_{adj}=0.692) of variance in ORGA. Finally, LEAD (beta=0.776) had a statistically significant positive effect on SUPP at the 0.01 level, explaining a high level (R^2_{adj}=0.602) of the variance in SUPP, as shown in Table 3.

Table 2. Assessing the indicators of the lower-order and higher-order construct

Construct	Indicator	Lower-order construct		Higher-order construct		VIF
		Weight	Loading	Weight	Loading	
LEAD	IDEA	0.106	0.894	0.125	0.897	4.098
	INTE	0.426*	0.942	0.377*	0.932	3.881
	INDI	0.319*	0.896	0.350*	0.906	2.899
	INSP	0.243*	0.903	0.242*	0.902	3.450
SUPP	RESO	0.299*	0.808	0.325*	0.819	1.766
	KNOWL	0.460*	0.930	0.432*	0.923	2.663
	TIME	0.373*	0.885	0.379*	0.885	2.300
ORGA	RULE	0.388*	0.867	0.436*	0.887	1.997
	FRIEN	0.276*	0.865	0.280*	0.858	2.647
	RESP	0.270*	0.805	0.175*	0.758	1.961
	FAIR	0.247*	0.841	0.280*	0.858	2.372
KNOWS	PROB	0.248*	0.838	0.271*	0.847	2.248
	INFO	0.217*	0.874	0.204*	0.870	2.888
	RESM	0.230*	0.918	0.234*	0.918	4.168
	STAT	0.146*	0.896	0.146*	0.895	4.277
	COMM	0.286*	0.912	0.274*	0.907	4.055
ATTR	ADVA	0.278*	0.890	0.267*	0.888	3.084
	COMPA	0.237*	0.889	0.259*	0.894	3.341
	COMPL	0.067	0.819	0.068	0.818	3.099
	TRAI	0.212*	0.859	0.195*	0.854	3.108
	OBSE	0.353*	0.867	0.357*	0.868	2.062
IRU	IRU1	0.372*	0.913	-	-	2.846
	IRU2	0.429*	0.948	-	-	3.633
	IRU3	0.290*	0.875	-	-	2.525
CRU	CRU1	0.476*	0.896	-	-	1.965
	CRU2	0.038	0.787	-	-	2.708
	CRU3	0.276*	0.874	-	-	2.993
	CRU4	0.348*	0.869	-	-	2.589
PRU	PRU1	0.533*	0.952	-	-	2.865
	PRU2	0.520*	0.949	-	-	2.865
RU	IRU	-	-	0.309*	0.901	2.897
	CRU	-	-	0.293*	0.883	2.633
	PRU	-	-	0.493*	0.940	2.740

Note: *p-value<0.05; T-Weight>1.96

Table 3. Path coefficients and significance for the structural model

Path	DE	t-value	IE	t-value	TE	t-value	f^2	R^2_adj
ATTR->RU	0.391**	5.617	-	-	0.391**	5.617	0.059	0.525
KNOWS->RU	0.213**	2.989	0.326**	5.548	0.539**	11.913	0.016	
ORGA->RU	-0.041	-0.595	-	-	-0.041	-0.595	0.001	
SUPP->RU	0.187**	3.513	0.383**	9.109	0.570**	12.671	0.021	
LEAD->RU	0.043	0.809	0.429**	9.355	0.472**	14.410	0.001	
KNOWS->ATTR	0.834**	0.023	-	-	0.834**	36.319	1.996	0.813
SUPP->ATTR	0.096**	0.028	0.569**	21.005	0.665**	24.089	0.026	
LEAD->ATTR	-	-	0.516**	18.866	0.516**	18.866	-	
SUPP->KNOWS	0.683**	26.184	-	-	0.683**	26.184	0.873	0.465
LEAD->KNOWS	-	-	0.530**	20.488	0.530**	20.488	-	
SUPP->ORGA	0.551**	13.035	-	-	0.551**	13.035	0.392	0.692
LEAD->ORGA	0.329**	7.483	0.427**	12.515	0.757**	36.634	0.140	
LEAD->SUPP	0.776**	38.727	-	-	0.776**	38.727	1.516	0.602

Note: **p-value<0.01, DE=direct effect, IE=indirect effect, TE=total effect

For the analysis using PLS-SEM, which includes formative measurement models, one important consideration is that indicators within the same construct should not be correlated. This can be assessed using the VIF, which should be below 5.0. If the VIF exceeds this threshold, the indicator should be removed from the model [22]. A VIF value below 3.3 indicates high-quality indicators and suggests no CMB [24], [25]. In this study, none of the 33 indicators exhibited VIF values exceeding 5.0. Moreover, over 75.76% of the indicators had VIF values below 3.3. The researchers noted that this might be due to the use of higher-order constructs, which tends to mitigate such issues [24].

SUPP emerged as the most influential factor in RU among teachers under the office of the basic education commission, highlighting the importance of resource development and structural support within educational institutions. This includes promoting research knowledge, skills, and experience, as well as providing opportunities for professional development through further education and training, along with sufficient funding and facilities for conducting research. These findings align with several international studies [21], [28], which emphasize the importance of support in terms of knowledge, funding, and time in promoting RU. Moreover, Lin [29] found that SUPP positively affects an organization's intention to facilitate knowledge sharing, a key component of RU. However, the Thai educational context presents unique characteristics, such as a centralized administrative structure and close relationships among personnel, which may result in SUPP playing a more prominent role than in more developed countries. Additionally, the study found that SUPP influences the ORGA, consistent with Köse [30], who demonstrated that such support positively affects the climate and teacher engagement. Therefore, promoting RU in Thai schools should prioritize the development of comprehensive support systems, encompassing knowledge, resources, and an ORGA conducive to research and the application of research findings in enhancing teaching and learning practices.

Research knowledge and skills are the second most influential factors in teachers' RU, exerting both direct and IE. This finding aligns with Bloom's learning theory [31], which emphasizes that effective utilization of any resource requires a solid foundation of knowledge and experience. The results of this study are consistent with the research of Moe and Enmarker [19] but further highlight the significant role of indirect influence. Additionally, Sanluang and Aungsuroch [32] found that research experience plays a critical role in enhancing RU, while Goldstein *et al.* [33] explained that knowledge and skills influence perception and decision-making regarding various phenomena. This is also supported by Häggman [34], who found that knowledge, skills, and experience impact the characteristics of research. Therefore, promoting RU in education should prioritize the continuous development of teachers' research knowledge and skills through hands-on training, building research networks, and encouraging teacher participation in research projects. This will enhance teachers' research knowledge, skills, and experience, ultimately leading to more effective use of research in improving teaching and learning practices.

LEAD of administrators is one of the most influential factors affecting RU, albeit indirectly. This is because teachers' RU behaviors, such as solving classroom problems using research findings or modifying practices based on research, are primarily driven by internal motivations rather than the direct authority of organizational leaders [35]. However, due to their roles within the organization, administrators' leadership indirectly influences teachers' RU. The influence of LEAD on RU can be explained through the diffusion of innovations theory, which posits that leaders' attitudes toward change positively impact the transformation of organizations into innovative entities, allowing for the adoption of new ideas and the replacement of traditional methods [17]. This is consistent with the findings of Scott-Findlay and Golden-Biddle [36], who noted that organizational leaders play a crucial role in facilitating and shaping policies that promote RU. Similarly, LEAD influences RU, though these studies observed direct influence [15], [19]. The results of this study suggest that the difference may be attributed to variations in organizational context and research methods.

The ATTR have a direct influence on teachers' RU, particularly when teachers perceive that research can be practically applied in teaching and learning. For example, introducing new teaching strategies that enhance student learning or presenting methods that align with the current work context can significantly impact utilization. Diffusion of innovations theory [17] explains that a positive perception of the characteristics of an innovation, in this case, research, leads to acceptance and utilization. This finding is consistent with the study by Tanye [37], which found that students' positive perceptions influenced their use of innovations in universities, and with Kim *et al*. [38] who noted that relative advantage, compatibility, and complexity of innovations positively impacted their adoption. These research findings highlight the importance of designing and communicating research characteristics to meet the needs and contexts of teachers, thereby promoting effective RU in education. For instance, presenting research findings in an easily understandable format, with clear guidelines for practical application and demonstrating tangible benefits for both students and teachers, will encourage teachers to recognize the value of research and apply it more frequently to enhance teaching and learning.

The findings revealed that ORGA is the only factor that does not influence teachers' RU, which contradicts diffusion of innovations theory Dearing and Cox [17] and the previous studies [15], [39], which found that ORGA impacts innovation adoption and work performance. Furthermore, Gregory *et al*. [40] discovered that organizational culture affects organizational effectiveness, and Yang [41] highlighted the importance of knowledge sharing for organizational learning and effectiveness. However, this divergent result can be explained by the unique characteristics of the teaching profession and the Thai educational context, particularly in two key aspects. First, the professional autonomy of teachers, which aligns with self-determination theory [42], emphasizes the importance of autonomy in decision-making. Thai teachers often have the freedom to make decisions regarding teaching methods and the adoption of innovations in

their classrooms, consistent with concept of teacher professionalism [43]. Second, teachers' intrinsic motivation, which is explained by self-determination theory and adult learning theory [44], suggests that teachers are highly motivated to develop their professional skills and improve teaching quality, without relying on external organizational stimuli. Therefore, teachers' decisions to utilize research may depend more on individual factors than on the overall ORGA. These findings indicate that promoting RU in Thai education should focus on enhancing teachers' individual capacities, supporting professional autonomy, and fostering intrinsic motivation, rather than solely on modifying the overall ORGA.

4. CONCLUSION

The findings of this study represent a significant turning point in understanding the factors that influence RU in the context of Thai education. Notably, the discovery that ORGA does not impact teachers' RU contrasts with previous studies and highlights the unique characteristics of the Thai teaching profession, which is characterized by a high degree of autonomy and intrinsic motivation. These findings suggest that policies aimed at promoting RU in Thai education should focus on enhancing the individual capabilities of teachers, rather than attempting to alter the ORGA as a whole. This includes developing teachers' research knowledge and skills and providing SUPP tailored to the specific needs of each teacher. Additionally, the use of the disjoint 2-stage approach in PLS-SEM in this study introduces an innovative research method to Thai educational research, offering a deeper understanding of the relationships between various factors. As a result, this research not only challenges existing ideas about promoting RU in education but also opens new perspectives on teacher professional development and educational reform in Thailand, emphasizing the empowerment of teachers as independent and effective researchers and research users.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
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O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

All research activity by the authors included in the review have been undertaken with the approval of Chiang Mai University Ethics Committees, COA No. 018/65 CMUREC No. 65/032.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author [SD], upon reasonable request. The data are not publicly available due to privacy and ethical restrictions, as they contain information that could compromise the privacy of research participants, including personal information of teachers under the Office of the Basic Education Commission.

REFERENCES

[1] J. E. Squires, C. A. Estabrooks, P. Gustavsson, and L. Wallin, "Individual determinants of research utilization by nurses: a systematic review update," *Implementation Science*, vol. 6, pp. 1–20, Dec. 2011, doi: 10.1186/1748-5908-6-1.

[2] Y. Liu and A. Pásztor, "Effects of problem-based learning instructional intervention on critical thinking in higher education: a meta-analysis," *Thinking Skills and Creativity*, vol. 45, p. 101069, Sep. 2022, doi: 10.1016/j.tsc.2022.101069.

[3] M. A. Goralski and T. K. Tan, "Artificial intelligence and sustainable development," *The International Journal of Management Education*, vol. 18, no. 1, p. 100330, Mar. 2020, doi: 10.1016/j.ijme.2019.100330.

[4] A. Boaz, H. Davies, A. Fraser, and S. Nutley, *What works now?: evidence-informed policy and practice*. Bristol, UK: Policy Press, 2019.

[5] S. M. Nutley, I. Walter, and H. T. O. Davies, *Using evidence: how research can inform public services*. Bristol, UK: Policy Press, 2007.

[6] E. Farley-Ripple, H. May, A. Karpyn, K. Tilley, and K. McDonough, "Rethinking connections between research and practice in education: a conceptual framework," *Educational Researcher*, vol. 47, no. 4, pp. 235–245, May 2018, doi: 10.3102/0013189X18761042.

[7] T. Cain, *Becoming a research-informed school: why? what? how?*. New York: Routledge, 2018, doi: 10.4324/9781315143033.

[8] M. S. Bauer, L. Damschroder, H. Hagedorn, J. Smith, and A. M. Kilbourne, "An introduction to implementation science for the non-specialist," *BMC Psychology*, vol. 3, no. 1, p. 32, Dec. 2015, doi: 10.1186/s40359-015-0089-9.

[9] B. M. Melnyk, L. Gallagher-Ford, L. E. Long, and E. Fineout-Overholt, "The establishment of evidence-based practice competencies for practicing registered nurses and advanced practice nurses in real-world clinical settings: proficiencies to improve healthcare quality, reliability, patient outcomes, and costs," *Worldviews on Evidence-Based Nursing*, vol. 11, no. 1, pp. 5–15, Feb. 2014, doi: 10.1111/wvn.12021.

[10] J. F. Hair Jr., G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A primer on partial least squares structural equation modeling (PLS-SEM)*, Thousand Oaks, CA: SAGE Publications Inc., 2016.

[11] Office of National Higher Education Science Research and Innovation Policy Council, "Thailand research and innovation utilization promotion act; TRIUP act 2021," THIPA. Accessed: Jun. 02, 2024. [Online]. Available: https://www.nxpo.or.th/th/bda/

[12] M. Chankseliani and T. McCowan, "Higher education and the sustainable development goals," *Higher Education*, vol. 81, no. 1, pp. 1–8, Jan. 2021, doi: 10.1007/s10734-020-00652-w.

[13] E. C. Ness, "The role of information in the policy process: implications for the examination of research utilization in higher education policy," in *Higher Education: Handbook of Theory and Research*, J. C. Smart, Ed., Dordrecht: Springer, 2010, pp. 1–49, doi: 10.1007/978-90-481-8598-6_1.

[14] H. Gupta, S. Kusi-Sarpong, and J. Rezaei, "Barriers and overcoming strategies to supply chain sustainability innovation," *Resources, Conservation and Recycling*, vol. 161, p. 104819, Oct. 2020, doi: 10.1016/j.resconrec.2020.104819.

[15] G. G. Cummings, C. A. Estabrooks, W. K. Midodzi, L. Wallin, and L. Hayduk, "Influence of organizational characteristics and context on research utilization," *Nursing Research*, vol. 56, no. 4, pp. S24–S39, Jul. 2007, doi: 10.1097/01.NNR.0000280629.63654.95.

[16] S.-A. Li, L. Jeffs, M. Barwick, and B. Stevens, "Organizational contextual features that influence the implementation of evidence-based practices across healthcare settings: a systematic integrative review," *Systematic Reviews*, vol. 7, no. 1, p. 72, Dec. 2018, doi: 10.1186/s13643-018-0734-5.

[17] J. W. Dearing and J. G. Cox, "Diffusion of innovations theory, principles, and practice," *Health Affairs*, vol. 37, no. 2, pp. 183–190, Feb. 2018, doi: 10.1377/hlthaff.2017.1104.

[18] J. E. Squires *et al.*, "Attributes of context relevant to healthcare professionals' use of research evidence in clinical practice: a multi-study analysis," *Implementation Science*, vol. 14, no. 1, p. 52, Dec. 2019, doi: 10.1186/s13012-019-0900-8.

[19] A. Moe and I. Enmarker, "Research utilization in municipality nursing practice in rural districts in Norway: a cross-sectional quantitative questionnaire study," *BMC Nursing*, vol. 19, no. 1, p. 86, Dec. 2020, doi: 10.1186/s12912-020-00475-1.

[20] A. Kitson *et al.*, "Using complexity and network concepts to inform healthcare knowledge translation," *International Journal of Health Policy and Management*, vol. 7, no. 3, pp. 231–243, Jul. 2017, doi: 10.15171/ijhpm.2017.79.

[21] J. C. Westland, "Lower bounds on sample size in structural equation modeling," *Electronic Commerce Research and Applications*, vol. 9, no. 6, pp. 476–487, Nov. 2010, doi: 10.1016/j.elerap.2010.07.003.

[22] J. F. Hair, M. C. Howard, and C. Nitzl, "Assessing measurement model quality in PLS-SEM using confirmatory composite analysis," *Journal of Business Research*, vol. 109, pp. 101–110, Mar. 2020, doi: 10.1016/j.jbusres.2019.11.069.

[23] M. Sarstedt, J. F. Hair, J.-H. Cheah, J.-M. Becker, and C. M. Ringle, "How to specify, estimate, and validate higher-order constructs in PLS-SEM," *Australasian Marketing Journal*, vol. 27, no. 3, pp. 197–211, Aug. 2019, doi: 10.1016/j.ausmj.2019.05.003.

[24] J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson, W. C. Black, and R. E. Anderson, *Multivariate data analysis*, 8th ed. Andover: Cengage Learning EMEA, 2019.

[25] N. Kock, "A note on how to conduct a factor-based PLS-SEM analysis," *International Journal of e-Collaboration*, vol. 11, no. 3, pp. 1–9, Jul. 2015, doi: 10.4018/ijec.2015070101.

[26] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: indeed a silver bullet," *Journal of Marketing Theory and Practice*, vol. 19, no. 2, pp. 139–152, Apr. 2011, doi: 10.2753/MTP1069-6679190202.

[27] J. Henseler, C. M. Ringle, and R. R. Sinkovics, "The use of partial least squares path modeling in international marketing," in *New Challenges to International Marketing (Advances in International Marketing)*, R. R. Sinkovics and P. N. Ghauri, Eds., Leeds: Emerald Group Publishing Limited, 2009, pp. 277–319, doi: 10.1108/S1474-7979(2009)0000020014.
[28] W. Liu *et al.*, "Determinants of knowledge translation from health technology assessment to policy-making in China: from the perspective of researchers," *PLOS ONE*, vol. 13, no. 1, p. e0190732, Jan. 2018, doi: 10.1371/journal.pone.0190732.
[29] H.-F. Lin, "Impact of organizational support on organizational intention to facilitate knowledge sharing," *Knowledge Management Research & Practice*, vol. 4, no. 1, pp. 26–35, Feb. 2006, doi: 10.1057/palgrave.kmrp.8500083.
[30] A. Köse, "The relationship between work engagement behavior and perceived organizational support and organizational climate," *Journal of Education and Practice*, vol. 7, no. 27, pp. 42–52, 2016.
[31] I. Hyder and S. Bhamani, "Bloom's taxonomy (cognitive domain) in higher education settings: reflection brief," *Journal of Education and Educational Development*, vol. 3, no. 2, pp. 288–300, Dec. 2016, doi: 10.22555/joeed.v3i2.1039.
[32] C. S. Sanluang and Y. Aungsuroch, "Predictive factors for research utilization in nursing practice among professional nurses, regional hospitals, Thailand," *Journal of Health Research*, vol. 30, no. 1, pp. 25–31, 2016, doi: 10.14456/jhr.2016.4.
[33] B. Goldstein, C. Ryan, and J. Baro, *Sensation and perception*, 10th ed. Cengage Learning, 2017.
[34] S. K. Häggman, "Functional actors and perceptions of innovation attributes: influence on innovation adoption," *European Journal of Innovation Management*, vol. 12, no. 3, pp. 386–407, Jul. 2009, doi: 10.1108/14601060910974246.
[35] T. Ballard, G. Yeo, S. Loft, J. B. Vancouver, and A. Neal, "An integrative formal model of motivation and decision making: the MGPM*," *Journal of Applied Psychology*, vol. 101, no. 9, pp. 1240–1265, Sep. 2016, doi: 10.1037/apl0000121.
[36] S. Scott-Findlay and K. Golden-Biddle, "Understanding how organizational culture shapes research use," *JONA: The Journal of Nursing Administration*, vol. 35, no. 7, pp. 359–365, Jul. 2005, doi: 10.1097/00005110-200507000-00008.
[37] H. A. Tanye, "Perceived attributes of innovation: perceived security as an additional attribute to roger's diffusion of innovation theory," *International Journal of Multicultural and Multireligious Understanding*, vol. 3, no. 6, pp. 6–18, Dec. 2016, doi: 10.18415/ijmmu.v3i6.57.
[38] M. J. Kim, C.-K. Lee, and M. W. Preis, "The impact of innovation and gratification on authentic experience, subjective well-being, and behavioral intention in tourism virtual reality: the moderating role of technology readiness," *Telematics and Informatics*, vol. 49, p. 101349, Jun. 2020, doi: 10.1016/j.tele.2020.101349.
[39] H. Imron, R. Indradewa, and T. Y. R. Syah, "The effects of compensation, and organizational climate on employees' performance by organizational commitment," *Journal of Multidisciplinary Academic*, vol. 4, no. 5, pp. 300–307, 2020.
[40] B. T. Gregory, S. G. Harris, A. A. Armenakis, and C. L. Shook, "Organizational culture and effectiveness: a study of values, attitudes, and organizational outcomes," *Journal of Business Research*, vol. 62, no. 7, pp. 673–679, Jul. 2009, doi: 10.1016/j.jbusres.2008.05.021.
[41] J. Yang, "The impact of knowledge sharing on organizational learning and effectiveness," *Journal of Knowledge Management*, vol. 11, no. 2, pp. 83–90, Apr. 2007, doi: 10.1108/13673270710738933.
[42] E. L. Deci and R. M. Ryan, "Self-determination theory," in *Handbook of Theories of Social Psychology*, P. A. M. van Lange, A. W. Kruglanski, and E. T. Higgins, Eds., London: SAGE Publications Ltd., 2012, pp. 416–437, doi: 10.4135/9781446249215.n21.
[43] C. Wardoyo, A. Herdiani, and S. Sulikah, "Teacher professionalism: analysis of professionalism phases," *International Education Studies*, vol. 10, no. 4, pp. 90–100, Mar. 2017, doi: 10.5539/ies.v10n4p90.
[44] C. Kenner and J. Weinerman, "Adult learning theory: applications to non-traditional college students," *Journal of College Reading and Learning*, vol. 41, no. 2, pp. 87–96, Mar. 2011, doi: 10.1080/10790195.2011.10850344.

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