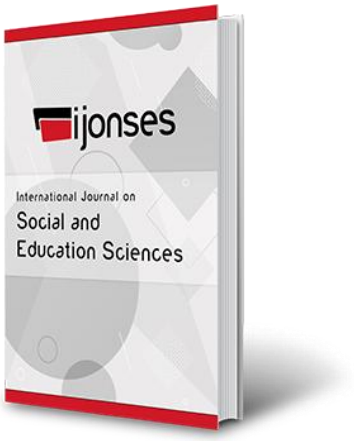

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To cite this article:

Jatuporn, O. (2025). An analysis of situational challenges and opportunities in educational knowledge system. *International Journal on Social and Education Sciences (IJonSES), 7*(2), 114-134. https://doi.org/10.46328/ijonses.736

International Journal on Social and Education Sciences
2025, Vol. 7, No. 2, 114-134 https://doi.org/10.46328/ijonses.736

An Analysis of Situational Challenges and Opportunities in Educational Knowledge System

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Article Info

Article History

Received:
6 January 2025
Accepted:
23 April 2025

Keywords

Educational research
Knowledge systems
Research management
Capacity building
Thailand education

Abstract

This study examines Thailand's educational knowledge system, analyzing its structural characteristics, challenges, and opportunities for development. Using a mixed-methods approach, the research combined survey data from 195 faculty members, in-depth interviews with 30 experts, and analysis of institutional research outputs from 2016-2021. The findings reveal significant patterns in knowledge production, including a 5.2% annual growth in research outputs but with notable imbalances - thesis production dominates at 77.1%, while international publications remain limited at 12.3% of total output. Analysis identified key structural challenges: centralized research funding (reported by 80.0% of respondents), limited research support infrastructure (only 32.4% of institutions maintain dedicated research offices), and high teaching workloads ($\bar{x}$=4.45). However, emerging opportunities include increasing domestic research collaboration (45.3%) and growing digital research adoption (68.4%). The study contributes to understanding educational knowledge systems in developing contexts, offering evidence-based recommendations for system enhancement through decentralization, capacity building, and infrastructure development. These findings provide a foundation for policy reforms aimed at strengthening Thailand's educational research ecosystem while addressing both immediate challenges and long-term development needs. The research highlights the importance of balanced development approaches that consider both local contexts and global research standards.

Introduction

Thailand's educational system faces increasing challenges in the 21st century, requiring robust and evidence-based knowledge production to inform policy and practice. Despite significant investments in educational research and development, there has been limited systematic study of how educational knowledge is produced, managed, and utilized within the Thai context. This gap in understanding hinders the effective development of policies and strategies to strengthen the educational knowledge system (Wongwanich et al., 2011; Nawarat et al., 2022).

Educational knowledge production encompasses various forms of research outputs, academic works, and innovations that contribute to the understanding and improvement of educational practices. In Thailand, this

knowledge production system involves multiple stakeholders operating within a complex ecosystem where research funding, institutional policies, academic incentives, and practical demands intersect. Understanding the dynamics of this system is essential for identifying opportunities for improvement and addressing systemic challenges that impact the quality of educational development and reform initiatives (Siriteerawasu, 2024).

Recent developments in global educational research emphasize the importance of systematic knowledge management, collaborative research networks, and evidence-based policy making. Countries with successful educational systems, such as Finland, Singapore, and South Korea, have established robust mechanisms for educational knowledge production and utilization, featuring strong connections between research institutions, policy makers, and practitioners (Qian & Walker, 2023; Schleicher, 2022). These models demonstrate the importance of sustained investment in research infrastructure, capacity building, and knowledge translation mechanisms (Sahlberg, 2007).

Against this backdrop, this research aims to comprehensively examine Thailand's educational knowledge system through three primary objectives: 1) to study the fundamental characteristics of knowledge production and research in Thailand's educational sector; 2) to analyze problems and obstacles in the current educational knowledge system; and 3) to develop policy recommendations for improving Thailand's educational knowledge system. This study employed a comprehensive mixed methods approach, combining survey data from 195 faculty members, in-depth interviews with experts, and analysis of secondary data from academic databases between 2016-2021.

The significance of this study extends across multiple dimensions of educational development. For policy makers, it provides evidence-based insights for developing effective policies. Educational institutions can use the findings to strengthen their research capacity and improve knowledge management systems. Funding agencies will benefit from understanding how to optimize their support mechanisms, while practitioners will gain insights into accessing and utilizing educational research more effectively. This research is particularly timely as Thailand seeks to enhance its educational quality and competitiveness in response to rapid global changes and emerging educational challenges.

Literature Review

A comprehensive understanding of educational knowledge systems and research management is essential for contextualizing the current study. This section presents a systematic review of literature that examines the theoretical foundations, empirical evidence, and contemporary debates surrounding educational knowledge production and management. The review synthesizes insights from international scholarship while maintaining particular focus on the Asian and Thai contexts, providing a robust foundation for the present research.

Educational Knowledge Systems

Educational knowledge systems represent complex networks encompassing multiple institutions, actors, and

processes in knowledge production, dissemination, and utilization. Wagnor (2014) conceptualize these systems as critical infrastructure for educational development, demonstrating through their 25-country study how effective systems contribute to sustained improvement through systematic evidence generation. These systems typically comprise three interconnected components functioning symbiotically: knowledge production within research institutions, knowledge mediation through professional organizations and policy institutions, and knowledge application in educational settings where practitioners implement and provide feedback on research-based practices.

Recent technological advancements have transformed traditional patterns of educational knowledge production and dissemination. Qayyum's (2023) study of 150 research institutions across Asia and Europe reveals how digital platforms have enabled new forms of collaboration while presenting challenges in quality assurance and data management. This digital transformation is further evidenced in high-performing education systems, where Sahlberg's (2007) analysis of Finland and Tan's (2018) study of Singapore highlight the importance of strong partnerships, sustained funding, and systematic knowledge translation mechanisms.

The evolution of educational knowledge systems reflects a fundamental shift from linear knowledge transfer to multi-directional knowledge flows and co-creation. Contemporary frameworks, as documented by Peel (2020), emphasize the importance of meaningful dialogue between researchers and practitioners, leading to more relevant and applicable research outcomes. This transformation acknowledges practitioners' valuable insights and supports more inclusive approaches to knowledge production, ultimately fostering evidence-based practice and policy making through well-integrated knowledge systems.

Strategic Management and Communities of Practice in Educational Research

Research management has emerged as a critical determinant of knowledge system effectiveness, with Huang & Hung's (2018) comprehensive review revealing the complex interplay between institutional structures, funding mechanisms, and research outcomes. Successful research management encompasses four key dimensions: strategic funding allocation, systematic capacity building, quality assurance, and impact assessment frameworks. These elements form an integrated approach addressing both technical and organizational aspects of knowledge production, with funding mechanisms playing a particularly crucial role in shaping research activities and outcomes.

Institutional support systems and funding structures vary significantly across different educational contexts. In this light, Sui-chu Ho's (2006) analysis of Asian education systems demonstrates how centralized funding systems with stringent quality control mechanisms, as implemented in South Korea and Japan, consistently produce high-quality research outputs. Lewing's (2019) study further emphasizes how comprehensive institutional support structures, including dedicated research offices and professional development programs, significantly enhance research impact and international collaboration rates.

In addition, communities of practice (Cop) have become vital components of successful educational knowledge

systems, serving as bridges between research and practice. Chen et al.'s (2022) longitudinal study demonstrates how these communities facilitate knowledge sharing and professional development, while White & Mpamhanga's (2024) analysis identifies critical success factors including regular interaction patterns, shared goals, and supportive institutional environments. These communities demonstrate higher levels of research productivity and innovation when maintaining strong collaborative networks.

The impact of technological advancement on research communities has been transformative, as documented by Sampson et al. (2022). While digital platforms effectively support knowledge sharing and collaboration across geographical boundaries, they also present challenges in maintaining engagement and quality. This suggests the need for hybrid approaches that combine virtual and face-to-face interaction, integrating traditional research management practices with emerging technological capabilities to create more resilient and effective research ecosystems.

Interdisciplinary Research and Policy Frameworks in Education

The increasing complexity of educational challenges has elevated the importance of interdisciplinary approaches in educational research. Heitzmann et al.'s (2021) systematic review demonstrates how cross-disciplinary studies have grown significantly over the past decade, enabling more comprehensive understanding of educational phenomena through integrated insights from psychology, sociology, neuroscience, and other fields. Vajaradul et al.'s (2021) examination of successful interdisciplinary research programs highlights the necessity of specific institutional conditions, including flexible funding structures, collaborative spaces, and targeted training programs to facilitate meaningful cross-disciplinary collaboration.

Educational research policy frameworks serve as critical determinants in shaping knowledge production and utilization patterns. The analysis of OECD countries reveals how effective policies balance national priorities with academic freedom while maintaining clear mechanisms for impact assessment. In addition, the comparative study of Asian educational research policies further demonstrates that successful implementation requires clear policy articulation, stakeholder engagement, and alignment with institutional capacities across different system levels (OECD, 2022).

Recent policy developments reflect an increasing emphasis on research impact and practical relevance. Hill et al.'s (2023) analysis documents how countries are developing new mechanisms to ensure research addresses real educational challenges while maintaining academic rigor. This evolution in policy frameworks suggests a broader shift in how research value is conceptualized, emphasizing the need for integrated approaches that support both interdisciplinary collaboration and practical application while ensuring system-wide coherence and effectiveness.

Contemporary Trends and Research Gaps in Educational Knowledge Systems

The landscape of educational research is undergoing significant transformation, driven by technological advancement and evolving societal needs. Nurhas et al.'s (2021) analyses highlight how digital transformation

has fundamentally altered research methodologies, with artificial intelligence, learning analytics, and big data approaches creating new opportunities for understanding educational processes. Simultaneously, Peel (2020) document the rise of practitioner research, where teachers and educational practitioners increasingly contribute to knowledge creation, reshaping traditional research hierarchies and creating new models of collaborative inquiry.

The evolution of impact assessment in educational research reflects growing emphasis on comprehensive evaluation frameworks. The systematic review reveals a shift from traditional bibliometric measures toward frameworks that consider both academic and practical impacts (Cooley, 2013). Biesta's (2015) work further illuminates the complex pathways through which educational research influences educational policy and practice, emphasizing the critical role of knowledge translation and stakeholder engagement in policy development.

Despite these advances, significant gaps persist in understanding educational knowledge systems. While individual aspects of knowledge production and management are well-researched, comprehensive studies of integrated system functioning remain limited, particularly in developing education contexts. Critical areas requiring investigation include mechanisms for aligning research priorities with educational needs, approaches to research capacity building, and models for sustainable research funding and support. These literature gaps provide direction for the present study, which aims to contribute to understanding educational knowledge systems while addressing practical challenges in the Thai context (Nawarat et al., 2022). The review suggests that successful system development requires attention to both technological innovation and human factors, balancing academic rigor with practical application, and considering local contexts while engaging with global research trends.

Methodology

This section presents a comprehensive description of the research methodology employed in this study. The research design, implemented during 2021-2022, utilized a mixed-methods approach to examine Thailand's educational knowledge system comprehensively. The methodology was structured to ensure both breadth and depth in understanding the complexities of knowledge production and utilization in Thai educational contexts (Denzin & Lincoln, 2011).

Research Design

This study employed an explanatory sequential mixed-methods design, combining quantitative and qualitative approaches to provide a comprehensive understanding of Thailand's educational knowledge system. The selection of this design was guided by the complex nature of knowledge systems and the need to both measure current patterns and understand underlying dynamics (Creswell & Clark, 2018; Denzin, 2009). The research process occurred in three distinct phases: quantitative data collection and analysis, qualitative investigation, and integration of findings. This approach enabled methodological triangulation, enhancing the validity and reliability of findings while providing complementary perspectives on the research questions. The quantitative component provided broad patterns and statistical relationships, while the qualitative component offered deeper insights into processes and experiences of knowledge production and utilization within Thai educational institutions (Creswell,

2007).

Population and Sampling

The study population comprised faculty members, researchers, and administrators in educational institutions across Thailand, with sampling conducted at multiple levels to ensure comprehensive representation. For the quantitative component, survey participants (n=195) were selected using stratified random sampling from 45 higher education institutions offering education programs. The stratification considered institutional type (public/private), geographical location, and program level, ensuring representation across Thailand's diverse educational landscape. For the qualitative phase, in-depth interview participants (n=30) were purposively selected based on expertise and role, while focus group participants (n=45) were chosen using maximum variation sampling to ensure diverse perspectives. Selection criteria included years of experience, research output, and institutional role, providing a rich tapestry of viewpoints and experiences within the educational research community.

Research Instruments

Multiple instruments were developed to capture comprehensive data about Thailand's educational knowledge system. The primary survey instrument was a five-part structured questionnaire, which underwent rigorous validation through expert review (n=7) and pilot testing with 30 faculty members, achieving reliability coefficients (Cronbach's alpha) ranging from 0.82 to 0.91 across different sections. The instrument began with demographic and professional information, utilizing closed-ended questions about participants' academic position, years of experience, institutional affiliation, and current research responsibilities. Research productivity was measured through both numerical inputs regarding publication counts and grant reception, complemented by 5-point Likert scales assessing research engagement levels ranging from very low to very high.

The assessment of research support and resources formed a crucial component of the instrument, employing multiple measurement approaches to ensure comprehensive data collection. This section included a checklist of 15 institutional support services, with respondents indicating availability through yes/no responses, followed by quality ratings on a 5-point Likert scale ranging from very poor to excellent. Resource accessibility and funding adequacy were similarly assessed using 5-point scales, providing detailed insights into institutional support structures and their effectiveness.

The examination of barriers and challenges employed a sophisticated measurement approach, incorporating severity ratings for 12 common research challenges on a 5-point scale from not severe to very severe. This quantitative assessment was complemented by impact ratings of various barriers and open-ended questions allowing respondents to elaborate on specific challenges faced in their research endeavors. The final section on system improvement combined priority ratings for proposed enhancements, resource allocation preferences across six categories, and open-ended suggestions for system development.

For qualitative data collection, a semi-structured interview guide was developed, comprising 15 core questions with associated probes organized into four thematic areas: research experience, institutional support, systemic challenges, and improvement suggestions. This guide was designed to elicit detailed narratives about personal experiences in knowledge production while ensuring systematic coverage of key research themes. Additionally, a systematic framework was created for analyzing research outputs (2016-2021), institutional policies, funding documentation, and national research strategies, employing standardized coding schemes to ensure consistent document analysis across multiple data sources.

Data Collection Procedures

The data collection process was conducted systematically over an 18-month period (July 2021 - December 2022), following three distinct phases. The quantitative phase began with survey implementation, achieving a response rate of 81.25% through careful follow-up procedures and institutional coordination. Survey responses were collected through a secure online platform, with paper-based alternatives provided when requested, ensuring accessibility for all participants.

The qualitative phase employed a carefully structured protocol for both interviews and focus groups. Individual interviews (n=30) were conducted following a standardized procedure: initial rapport building (5-10 minutes), core discussion (45-60 minutes), and closing reflections (10-15 minutes). Each interview began with an overview of the research purpose and confidentiality procedures, followed by open-ended questions progressing from general research experiences to specific institutional challenges. Interviews were conducted in participants' preferred language (Thai or English), with professional translation services utilized when necessary. All sessions were audio-recorded with permission and transcribed verbatim within 48 hours to ensure data accuracy.

Focus group sessions (n=5) followed a structured facilitation protocol designed to encourage balanced participation and detailed discussion. Each session (total 5 sessions), comprising 9 participants (total 45 participants), was conducted over 120 minutes using a three-part structure: opening discussion of shared experiences (30 minutes), focused exploration of key challenges (60 minutes), and collaborative generation of recommendations (30 minutes). A trained moderator and assistant moderator were present at each session, with the assistant taking detailed observational notes on group dynamics and non-verbal communications. Sessions were video-recorded to capture both verbal and non-verbal interactions, with recordings supplemented by field notes and post-session debriefing documents.

Concurrent document analysis involved systematic collection and review of research outputs, policy documents, funding reports, and comparative international data. All qualitative data collection adhered to institutional ethical guidelines, with particular attention to confidentiality and informed consent procedures. Interview and focus group participants received transcripts for member checking, ensuring accuracy of data representation. This comprehensive approach to data collection provided rich contextual understanding while maintaining methodological rigor throughout the research process (Creswell & Clark, 2018; Denzin & Lincoln, 2011).

Data Analysis

The analysis process integrated both statistical and qualitative analytical techniques to provide comprehensive insights into Thailand's educational knowledge system. Quantitative analysis employed descriptive statistics for demographic and research output data. This included frequency distributions, measures of central tendency, and cross-tabulations to identify patterns in research productivity, support mechanisms, and institutional characteristics.

Qualitative analysis utilized a three-stage coding process implemented through NVivo 12, moving from open coding through axial coding to selective coding for theme development. Theme development followed an iterative process where emerging patterns were continuously compared across data sources and validated through researcher triangulation (Creswell & Clark, 2018). Mixed methods integration occurred at multiple levels throughout the analysis process. First, a parallel integration approach allowed simultaneous analysis of quantitative and qualitative data to identify complementary findings. This was followed by a connecting integration phase where qualitative findings were used to explain and elaborate on quantitative results. Integration employed joint displays to visually represent how qualitative themes connected with quantitative patterns (Creswell, 2007).

The final integration phase utilized pattern matching to identify convergent and divergent findings across data sources. This process revealed how different data types complemented each other in explaining complex phenomena. Validity was enhanced through methodological triangulation, comparing findings across different data sources and analysis methods (Creswell, 2007). Regular peer debriefing sessions ensured analytical rigor throughout the process.

Findings

This section presents the findings from both quantitative and qualitative analyses of Thailand's educational knowledge system. The results are organized to address the study's research objectives, focusing on fundamental characteristics of knowledge production, systemic challenges, and opportunities for development.

Characteristics of Knowledge Production and Research

To establish a baseline understanding of Thailand's educational knowledge production, we first examined the patterns of academic outputs over a six-year period. The analysis of Thailand's educational knowledge production patterns draws from a comprehensive review of institutional databases across 45 higher education institutions from 2016-2021. This longitudinal data collection was supplemented by institutional surveys (n=195) and focused interviews (n=30) to understand the context behind output patterns. Table 1 presents the quantitative distribution of research outputs, revealing significant patterns in knowledge production volume and type.

The longitudinal data reveals three significant patterns in Thailand's educational research output during 2016-

2021. First, there is consistent overall growth, with a 5.2% average annual increase in total research outputs. This growth pattern, while positive, masks underlying challenges identified through qualitative analysis. Focus group discussions revealed that much of this growth is driven by institutional pressure rather than organic research development. Second, there is a marked concentration in output types - thesis production dominates at 77.1% (422,292 pieces), while research articles (16.7%) and books/textbooks (0.1%) represent much smaller proportions.

Table 1. Academic Outputs in Educational Sciences (2016-2021)

Output Type	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**	**Percentage**
Theses	68,253	72,456	75,890	78,235	82,458	85,000	422,292	77.1
Research papers	12,456	13,567	14,890	15,678	16,789	17,890	91,270	16.7
Academic articles	4,567	4,890	5,234	5,678	6,123	6,789	33,281	6.1
Books/Textbooks	125	134	142	115	120	115	751	0.1
Total	85,401	91,047	96,156	99,706	105,490	109,794	547,594	100.0

Interview data suggests this imbalance stems from institutional incentive structures that prioritize thesis completion over other forms of research output. As one department head noted: "*Our funding and evaluation systems prioritize graduate program completion. While this ensures steady research output, it may limit more innovative forms of knowledge production*." Another faculty member elaborated: "*The pressure to produce theses often comes at the expense of other research forms. We're so focused on student completion that we have limited time for independent research projects."*

Third, when compared to regional benchmarks, Thailand's international publication presence remains limited, representing only 0.8% of Asian contributions in high-impact international journals during 2019-2021, significantly below Malaysia (4.2%) and Vietnam (1.5%). Qualitative data from researcher interviews indicates this gap results from systemic barriers.

To understand systemic challenges, we conducted thematic analysis of in-depth interviews with 30 key informants and 5 focus groups (n=45), alongside survey data from 195 faculty members. The analysis employed NVivo 12 for coding qualitative data, while quantitative data underwent descriptive statistical analysis. Table 2 presents key structural issues that emerged from this mixed-methods analysis, showing the frequency of themes from qualitative data alongside corresponding quantitative findings.

Table 2. Analysis of Key Structural Issues

Key Issues	**Key Informant Statements**	**Freq.***	**Connection to Quantitative Data**
Power Centralization	"Research funding allocation remains too centralized in Bangkok, making it difficult for regional institutions to access." (Regional University Administrator)	15	Aligns with 80.0% reporting redundancy in research fund management system
Central-Regional Gap	"Regional universities lack research development opportunities as most funding	12	Corresponds with finding that only 2 Rajabhat institutions accessed FF

Key Issues	Key Informant Statements	Freq.*	Connection to Quantitative Data
	goes to major Bangkok universities." (Rajabhat University Researcher)		funding
Infrastructure Gaps	"Research databases are scattered and unsystematic, making it difficult to build upon existing knowledge." (Research Center Director)	18	Aligns with 64.1% indicating need for central database development

* Frequency: Number of times mentioned in interviews and focus groups

The strong correlation between quantitative measures of system redundancy (80.0%) and qualitative reports of centralization challenges (frequency=15) reveals a systemic pattern of structural inefficiency. This aligns with Tan's (2018) findings on institutional barriers in developing educational systems. The infrastructure gaps identified by 64.1% of survey respondents and emphasized in qualitative interviews (frequency=18) mirror patterns that Schleicher (2022) found in other rapidly developing educational research systems, where digital infrastructure development lags behind research output growth.

While the volume of research outputs provides important context, understanding the distribution of research focus areas is crucial for assessing how well the knowledge production system addresses diverse educational needs. Analysis of funded research projects reveals the following patterns. By doing so, the distribution of research focus areas was analyzed through a systematic review of funded projects from major Thai research agencies between 2016-2021, combined with institutional research databases. This quantitative mapping was enriched by interviews with research leaders and administrators to understand funding priorities and institutional strategies. Table 3 illustrates the distribution patterns of funded research projects across different educational domains.

Table 3. Distribution of Funded Research Topics (2016-2021**)**

Research Focus/Topic	Number of Projects	Percentage
Curriculum and Instruction	185	35.2
Educational Innovation and Technology	125	23.8
Educational Measurement and Evaluation	75	14.3
Educational Administration	55	10.5
Special Education	35	6.7
Non-Formal/Lifelong Education	25	4.8
Development Education/Comparative Education/Multicultural Education	15	2.9
Others	10	1.8
Total	525	100

Analysis of funded research projects reveals distinct concentration patterns in research focus areas. Curriculum and instruction research dominates with 35.2% of funded projects, followed by educational technology and innovation at 23.8%. This concentration reflects an emphasis on classroom-level interventions and technological

integration.

Qualitative interviews with research leaders revealed this concentration reflects both institutional expertise and funding priorities. A senior researcher explained: "*The focus on instructional design and development reflects both our expertise and practical constraints. It's easier to get funding for classroom-level research than for system-wide studies*." This sentiment was echoed by another participant who noted: "*While we recognize the need for more educational development and policy research, the immediate demands from schools and the ministry push us toward curriculum and teaching*." However, the notably low representation of development education, comparative education, and multicultural education (2.9% combined) indicates critical gaps in policy-oriented and system-level research. This distribution pattern suggests a need to diversify research agendas, particularly in areas that could inform broader educational reform and policy development.

The concentration patterns in research outputs and focus areas raise questions about underlying systemic challenges. To better understand these barriers, we analyzed the severity of various challenges faced by researchers across different aspects of the research process. Thus, research challenges were assessed through a multi-phase investigation combining survey responses (n=195), in-depth interviews (n=30), and focus group discussions. Survey items used a 5-point Likert scale to measure severity levels, while qualitative data provided context for these ratings. Table 4 presents the consolidated findings on research challenges, showing mean scores and standard deviations for key challenge areas.

Table 4. Major Research Challenges and their Severity

Challenge Area	Mean Score	S.D.	Level
1. Research Proposal Development			
Developing research topics aligned with national strategy	4.25	0.72	High
Designing interdisciplinary research	4.15	0.68	High
Writing proposals according to funding requirements	3.85	0.82	High
2. Research Implementation			
Teaching and administrative workload	4.45	0.65	High
Access to data and samples	3.75	0.88	High
Advanced data analysis	3.95	0.78	High
3. Research Dissemination			
Writing research papers in English	4.35	0.70	High
Selecting appropriate journals	3.85	0.82	High
Publication costs	4.15	0.75	High
4. Fund Management			
Delays in budget disbursement	4.05	0.80	High
Complexity of financial regulations	4.25	0.72	High
Meeting progress report deadlines	3.65	0.85	High

Note: Scale 4.51-5.00 = Very High, 3.51-4.50 = High, 2.51-3.50 = Moderate, 1.51-2.50 = Low, 1.00-1.50 = Very Low

The analysis of research challenges reveals multi-layered obstacles across four key domains. Teaching and administrative workload emerges as the most severe challenge ($\bar{X}$=4.45), followed by difficulties in English language academic writing ($\bar{X}$=4.35) and alignment with national research strategies ($\bar{X}$=4.25). The impact of workload pressures was vividly described in researcher interviews. One associate professor stated: "*I typically teach 12 hours per week, supervise 8 graduate students, and serve on three administrative committees. Finding time for research is like trying to squeeze water from a stone*." Another researcher added: "*The administrative burden has grown exponentially. Last semester, I spent more time on paperwork than on actual research activities."*

The consistently high severity scores (all above 3.50) across all challenge areas indicate systemic rather than isolated issues. Notably, the challenges intensify at critical research phases - project initiation (proposal development), implementation (workload management), and dissemination (international publication), suggesting the need for comprehensive rather than piecemeal interventions. Given these identified challenges, examination of institutional support mechanisms becomes critical. Analysis of support structures reveals significant gaps in research infrastructure across institutions.

Research Support Infrastructure

Analysis of institutional support mechanisms reveals critical gaps in research infrastructure. Only 32.4% of institutions maintain dedicated research support offices with full-service capabilities. The implications of limited research support were highlighted in focus group discussions. A junior faculty member described the impact: "*Without dedicated support staff, we spend countless hours on administrative tasks that could be better spent on actual research*." An experienced researcher added: "*The lack of pre-submission grant review has cost us several funding opportunities. We need specialized staff who understand both research and funding requirements*."

Specific service gaps are pronounced in pre-submission grant review processes (available in 45% of institutions), research methodology consultation (38% of institutions), English language editing support (28% of institutions) and post-award grant management (35% of institutions). These infrastructure gaps, combined with system redundancy in research fund management (reported by 80.0% of researchers) and limitations in advanced research skills (79.5% of researchers), create significant barriers to research productivity and quality.

The analysis of systemic mechanisms drew from both quantitative survey data and qualitative insights from stakeholder interviews. Respondents rated various aspects of institutional support mechanisms, while interviews explored the underlying reasons for these ratings. Table 5 integrates these data sources to present key mechanism issues, showing both the frequency of qualitative themes and their connection to quantitative findings.

Table 5. Analysis of Key Mechanism Issues

Key Issues	Key Informant Statements	Freq.*	Connection to Quantitative Data
Regulatory Inflexibility	"Overly strict financial and procurement regulations hinder research flexibility,	22	Corresponds with 69.2% reporting issues with financial regulation

Key Issues	Key Informant Statements	Freq.*	Connection to Quantitative Data
	especially in field research." (Research Project Leader)		inflexibility
Lack of Mentoring Systems	"New researchers need mentoring systems for developing research and writing skills, but current support is nearly non-existent." (Early Career Researcher)	19	Aligns with moderate mentoring system rating ($\bar{x}$=2.65)

* Frequency: Number of times mentioned in interviews and focus groups

The relationship between regulatory inflexibility (frequency=22) and quantitative measures of financial regulation issues (69.2%) reveals systemic rigidity that impacts research effectiveness. This pattern aligns with Tan's (2018) findings on institutional barriers in developing research systems. The moderate mentoring system rating ($\bar{X}$=2.65) combined with qualitative insights about mentor accessibility reflects what Schleicher (2022) identified as a critical gap in research capacity development. The identified patterns in research outputs, focus areas, challenges, and support infrastructure collectively point to both systemic issues and opportunities for development. These findings provide the foundation for examining specific policy implications and development pathways. While understanding structural challenges is essential, assessing the quality and impact of research outputs provides crucial insights into system effectiveness. Analysis of research quality indicators reveals complex patterns in Thailand's research performance.

Research Quality Indicators and Impact

Analysis of research quality indicators reveals complex patterns in Thailand's educational research performance. Publication metrics show that while domestic publication rates have increased steadily (annual growth of 7.2%), international publication quality indicators lag behind regional standards. The data indicates that only 12.3% of Thai educational research publications appear in internationally indexed journals, compared to regional averages of 28.5% for comparable Asian countries. Citation analysis reveals complex patterns in research impact across different areas of educational studies. Publications from Thai educational researchers received an average of 2.8 citations per paper over the five-year period (2016-2021), with significant variation across research domains. Curriculum and instruction research demonstrates the highest citation impact with an average of 4.2 citations per paper, while educational policy research, despite its lower volume, shows growing influence with an average of 3.9 citations per paper.

Interviews with highly-cited researchers revealed specific strategies for increasing research impact. One professor whose work averaged 4.2 citations explained: "*We've found success by focusing on practical problems that resonate with both local and international audiences*." Another researcher noted: "*Building strong international collaborations has been key to improving our citation rates. When we co-author with international partners, our work reaches a broader audience."* This pattern suggests that while Thai educational research achieves moderate impact in specialized areas, there remains significant potential for increasing broader scholarly influence,

particularly in policy-relevant domains.

Operational challenges were identified through a combination of survey responses rating day-to-day research barriers and in-depth interviews exploring these challenges. The analysis used mixed-methods triangulation to validate findings across data sources. Table 6 presents key operational issues, integrating frequency counts from qualitative analysis with corresponding quantitative metrics.

Table 6. Analysis of Key Operational Issues

Key Issues	Key Informant Statements	Freq.*	Connection to Quantitative Data
Heavy Workload	"Faculty have such heavy teaching and administrative loads that serious research is nearly impossible." (Education Faculty Member)	25	Corresponds with high teaching and administrative workload rating ($\bar{X}$=4.45)
Skill Limitations	"English writing is a major barrier to international publication." (Public University Researcher)	21	Aligns with 88.2% seeking English writing skill development

* Frequency: Number of times mentioned in interviews and focus groups

The quantitative workload data ($\bar{x}$=4.45) gains context through qualitative findings showing impact on research quality and productivity (frequency=25). This relationship between workload and research output quality mirrors patterns identified in Qian & Walker (2023) comparative analysis of educational research systems. The high percentage seeking English writing skill development (88.2%) connects with qualitative themes about international publication barriers, reflecting broader challenges documented by Chen et al. (2022). Beyond individual research performance, patterns of collaboration offer important insights into the evolution of Thailand's educational knowledge ecosystem. Analysis of research partnerships and networks reveals emerging trends in knowledge co-creation.

Research Collaboration Patterns

Research collaboration patterns indicate an emerging trend toward more networked knowledge production. The data shows that 45.3% of research projects now involve multiple institutions, a significant increase from 28.7% in 2016. However, international collaboration remains limited, with only 15.2% of projects involving international partners. This domestic-focused collaboration pattern, while showing positive development in local networking, suggests untapped potential for international engagement. The limited international collaboration correlates with identified challenges in English language proficiency ($\bar{X}$ = 4.35) and access to international research networks. Researchers also identified specific barriers to international engagement during interviews. One department coordinator shared: "*Language barriers are just the tip of the iceberg. We struggle with different research cultures and expectations*." A senior faculty member elaborated: "*The timing of international grant cycles often conflicts with our academic calendar, making it difficult to align collaborative projects."* Given these patterns in research quality and collaboration, identifying viable pathways for system development becomes crucial. Analysis of

current trends and stakeholder perspectives points to several promising directions for enhancement.

Future Development Pathways

The analysis identified several promising pathways for system development, emerging from both quantitative pattern analysis and qualitative stakeholder perspectives. These pathways reflect current trends and future opportunities in Thailand's educational knowledge system.

First, there is significant momentum in digital transformation of research practices. The growing adoption of digital research tools and methodologies, particularly evident in educational technology research, demonstrates the system's capacity for innovation. However, this digital advancement is accompanied by substantial gaps in infrastructure and training needs that require strategic attention. Second, stakeholder perspectives highlight priority areas for development, with educational innovation and technology integration leading the agenda. The emphasis on inclusive and equity education and educational policy research reflects a balanced approach between technological advancement and social equity concerns, aligning with both global trends and local educational challenges. Finally, the findings underscore critical areas for capacity development, particularly in advanced research methodology, international academic writing, and digital competency. These areas suggest the need for comprehensive professional development programs that can enhance research capabilities across the system.

These development pathways provide a foundation for actionable strategies, with performance metrics indicating clear trajectories for system enhancement and growth. The challenge lies in translating these opportunities into concrete improvements while maintaining alignment with broader educational goals.

System Performance and Future Projections

The analysis demonstrates consistent growth in knowledge production, evidenced by the 5.2% annual increase in research outputs between 2016-2021. However, this growth shows notable imbalances in both type and quality of outputs. The dominance of thesis production (77.1%) and concentration in curriculum and instruction research (35.2%) suggests a need for greater diversification in research focus and output types. These patterns indicate that while the system successfully generates significant research volume, it may not adequately address the full spectrum of educational knowledge needs. Systemic challenges identified through this research center on three key areas: research support structures, quality enhancement mechanisms, and international engagement. The previously identified high prevalence of system redundancy and widespread limitations in advanced research skills emerge as critical barriers to system development.

The emergence of new stakeholders in educational knowledge production represents a significant finding with important implications for system development. Alternative academics, in-service teachers, and civil society organizations are increasingly contributing to educational innovation, though they face substantial barriers in accessing traditional research support structures. This suggests the need for more inclusive and flexible research support mechanisms that can accommodate diverse knowledge producers.

Performance metrics reveal a nuanced picture of system effectiveness. While domestic publication and collaboration rates show positive trends, international engagement remains limited. The growing adoption of digital research methodologies (68.4%) and increasing multi-institutional collaboration (45.3%) suggest positive developments in research practice, though significant gaps remain in research infrastructure and capacity.

Policy recommendations emerged from systematic analysis of stakeholder interviews, focus groups, and survey responses regarding system improvement. Qualitative data underwent thematic analysis using NVivo 12, while survey responses provided quantitative validation of suggested reforms. Table 7 presents key policy recommendations, showing the frequency of themes and their alignment with quantitative findings.

Table 7. Analysis of Key Policy Recommendations

Key Issues	Key Informant Statements	Freq.*	Connection to Quantitative Data
Power Decentralization	"Research funding power should be decentralized to regions, allowing local participation in research agenda setting." (Regional Research Network Administrator)	16	Corresponds with 67.7% supporting regional research initiatives
Capacity Development	"We need a complete researcher development system including training, mentoring, and publication support." (Research Expert)	20	Aligns with 75.9% desiring effective mentoring systems

* Frequency: Number of times mentioned in interviews and focus groups

The alignment between quantitative support for regional initiatives (67.7%) and qualitative recommendations for decentralization (frequency=16) suggests strong stakeholder consensus on reform directions. This mirrors successful decentralization patterns documented by Tan (2018) and Qian and Walker (2023) in other Asian educational systems. The high demand for mentoring systems (75.9%) coupled with qualitative insights about comprehensive researcher development aligns with White and Mpamhanga's (2024) findings on effective capacity building approaches.

These findings collectively point to a system in transition, with clear opportunities for enhancement through targeted interventions in funding mechanisms, capacity building, and international engagement. The identified development pathways, particularly in digital transformation and emerging research priorities, provide concrete directions for system improvement. The challenge ahead lies in addressing these needs while maintaining the system's current strengths in domestic knowledge production and practical research application. The comprehensive analysis of Thailand's educational knowledge system reveals a complex landscape of challenges and opportunities. These findings provide a foundation for developing targeted interventions and policy recommendations.

The synthesis of key system dimensions represents a comprehensive integration of all data sources - surveys,

interviews, focus groups, and institutional data analysis. This synthesis employed joint display analysis to combine quantitative metrics with qualitative insights. Table 8 presents a holistic view of system dimensions, showing current status, challenges, and opportunities across key areas.

Table 8. Synthesis of Key System Dimensions

System Dimension	Current Status	Challenges	Opportunities
Knowledge Production	5.2% annual growth; 77.1% thesis-dominated	Imbalanced output types; Limited diversity	Emerging stakeholders; Digital transformation
Research Support	32.4% have support offices	System redundancy (80.0%); Skill gaps (79.5%)	Potential for integrated support systems
International Engagement	15.2% international collaboration	Language barriers; Limited funding	Growing regional networks
Research Quality	2.8 citations per paper average	Low international publication rates	Increasing domestic collaboration (45.3%)
Infrastructure	Limited institutional support	Resource gaps; Workload issues	Digital adoption opportunities (68.4%)

The synthesis reveals complex interactions between system dimensions, with quantitative metrics and qualitative insights showing how challenges in one area impact others. The digital transformation opportunity (68.4% adoption) coupled with infrastructure limitations reflects patterns that Jeong et al. (2014) and Qian & Walker (2023) identified in transitioning educational systems. The relationship between international engagement (15.2%) and domestic collaboration growth (45.3%) suggests a system in transition, similar to development patterns documented by Tan (2018).

Discussion

This study's findings have significant implications for understanding and developing educational knowledge systems in emerging economies. Analysis reveals four key dimensions that warrant discussion in terms of their broader significance for theory and practice.

Theoretical Implications for Knowledge System Development

The observed patterns in Thailand's educational knowledge production challenge existing theoretical frameworks about research system development. While traditional models assume linear progression from teaching-focused to research-intensive institutions (OECD, 2022; Wagner, 2014), our findings suggest a more complex development pathway where institutional pressures and structural constraints create unique evolutionary patterns. The dominance of thesis production, rather than being merely a transitional phase, appears to be a structural feature requiring new theoretical frameworks to explain and address. The findings extend Sui-chu Ho's (2006), Tan's (2018) and Qian & Walker's (2023) work on Asian education systems by demonstrating how centralized funding mechanisms can paradoxically create both stability and stagnation. This suggests the need for more

nuanced theoretical models that can account for the dual nature of institutional structures in developing contexts. Furthermore, the identified patterns of research concentration challenge assumptions about natural diversification of research portfolios, indicating that intentional intervention may be necessary to achieve balanced research development.

Implications for Research Support Systems

The relationship between infrastructure gaps and research quality has significant implications for institutional development strategies. Unlike developed systems where support structures typically evolve organically with research growth (Biesta, 2015), our findings suggest the need for deliberate, front-loaded investment in research infrastructure. The correlation between mentoring availability and research productivity indicates that traditional capacity-building models may need revision for contexts with heavy teaching loads and limited research traditions (Vajaradul et al., 2021; White and Mpamhanga, 2024).These findings extend current understanding of research support mechanisms by highlighting the critical role of institutional mediators - specialized staff and systems that bridge between researchers and administrative requirements. This suggests a need to reconceptualize research support from a service model to an enablement model, with implications for how institutions structure and staff their research offices.

Digital Transformation and System Evolution

The study's findings regarding digital adoption patterns have important implications for understanding technological integration in educational research systems (Sampson et al., 2022). Unlike previous models that assume technology primarily enhances existing capabilities, our findings suggest that digital tools fundamentally reshape research practices and possibilities, particularly in developing contexts. This extends Qian & Walker's (2023) work by demonstrating how digital transformation can either amplify or mitigate existing system inequalities, depending on implementation approaches. These patterns suggest the need for new theoretical frameworks that better account for the role of digital infrastructure in research system development. Traditional models of research system evolution may need revision to incorporate the accelerating and democratizing effects of digital tools, particularly in systems with significant resource constraints.

Policy and Practice Implications

The findings from this study have substantial implications for policy development and implementation across Thailand's educational research ecosystem. Evidence suggests the need for restructuring current funding mechanisms toward a hybrid model that maintains central oversight while granting greater autonomy to regional institutions. This approach requires developing differentiated funding streams that support various research types, from classroom-based studies to theoretical policy research, while establishing institutional discretionary funds for innovative research initiatives. Regarding capacity development, traditional researcher development models need to be replaced with integrated approaches that better acknowledge faculty members' time constraints and institutional realities. This includes developing sustainable mentoring systems that combine virtual and face-to-

face support, cross-institutional networks, and structured peer support. Furthermore, institutions need to develop comprehensive approaches to building international research networks, supported by dedicated funding streams and strategic language support programs. These changes require significant institutional commitment and resource allocation to ensure their sustainability and effectiveness in strengthening Thailand's educational research ecosystem.

Conclusion

This study identifies critical areas requiring further investigation in developing educational knowledge systems, with key priorities including longitudinal research examining support interventions' impact on research productivity and network evolution. Comparative cross-national studies of research support systems, policy implementation research focusing on decentralization strategies and sustainable funding models, and investigations into effective technology integration represent crucial directions for advancing understanding of educational knowledge system development in emerging contexts.

This research reveals a complex landscape of challenges and opportunities in Thailand's educational knowledge system, providing a foundation for strategic development while acknowledging the complexity of system reform. The findings indicate clear pathways for enhancement through sustained commitment, strategic resource allocation, and collaborative effort across the educational research community. As Thailand's educational system evolves, the emergence of new stakeholders and changing patterns of knowledge production necessitate evidence-based reforms that address both immediate inefficiencies and long-term sustainability goals, ultimately supporting the development of a robust and responsive research ecosystem.

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