Journal of Information Science Research and Practice

Research Articles

การวิเคราะห์แนวโน้มความร่วมมือระหว่างสถาบัน: การศึกษาเชิงปริมาณของบันทึกความเข้าใจ (MOU) ของวิทยาลัยศิลปะ สื่อ และเทคโนโลยี มหาวิทยาลัยเชียงใหม่

Analyzing Institutional Partnership Trends: A Quantitative Study of MOUs at the College of Arts, Media and Technology, Chiang Mai University

นริศรา เลาหพัฒนาเลิศ [1,*] Narisara Laohapattanalert [1,*]

[1] งานบริหารงานวิจัยและวิเทศสัมพันธ์ วิทยาลัยศิลปะ สื่อ และเทคโนโลยี มหาวิทยาลัยเชียงใหม่ ประเทศไทย; Research and International Relations Office, College of Arts, Media and Technology, Chiang Mai University, Thailand

***** Corresponding author email: narisara.lao@cmu.ac.th

บทคัดย่อ

วัตถุประสงค์: การศึกษานี้มีวัตถุประสงค์เพื่อวิเคราะห์แนวโน้มความร่วมมือทางวิชาการระหว่างสถาบันในระดับอุดมศึกษา โดยมุ่งเน้นการวิเคราะห์โครงสร้างและรูปแบบของบันทึกความเข้าใจ ในฐานะกลไกเชิงกลยุทธ์ที่สนับสนุนการไหลเวียนของความรู้เชิงสถาบัน

วิธีการวิจัย: การวิจัยนี้ใช้ระเบียบวิธีเชิงปริมาณ โดยวิเคราะห์ข้อมูลบันทึกความเข้าใจจำนวน 40 ฉบับของวิทยาลัยศิลปะ สื่อ และเทคโนโลยี มหาวิทยาลัยเชียงใหม่ ระหว่างปี พ.ศ. 2566 ถึงต้นปี พ.ศ. 2569 โดยใช้การวิเคราะห์สถิติเชิงพรรณนาและการวิเคราะห์เอกสารเชิงสถาบัน เพื่อศึกษาตัวแปรด้านโครงสร้าง ได้แก่ การกระจายตัวทางภูมิศาสตร์ ระยะเวลาของข้อตกลง ระดับของสถาบัน สถานะของข้อตกลง และแนวโน้มเชิงเวลา

ผลการศึกษา: พบว่าความร่วมมือมีการกระจุกตัวในภูมิภาคเอเชีย โดยเฉพาะประเทศจีน ญี่ปุ่น และเกาหลีใต้ ซึ่งสะท้อนถึงความหนาแน่นของเครือข่ายความรู้ในภูมิภาค ข้อตกลงส่วนใหญ่มีระยะเวลา 5 ปี แสดงถึงการกำกับดูแลวงจรความร่วมมืออย่างเป็นระบบ และมีความสมดุลระหว่างความร่วมมือระดับมหาวิทยาลัยและระดับวิทยาลัย ซึ่งสนับสนุนการแลกเปลี่ยนข้อมูลและองค์ความรู้ในหลายระดับ นอกจากนี้ แนวโน้มการเพิ่มขึ้นของบันทึกความเข้าใจ (MOU) ยังสะท้อนถึงการขยายตัวของโครงสร้างพื้นฐานด้านความร่วมมือเชิงสถาบัน

การประยุกต์ใช้จากการศึกษานี้: ผลการศึกษาสามารถประยุกต์ใช้ในการบริหารจัดการความร่วมมือระหว่างประเทศ การพัฒนาระบบการจัดการข้อมูลวิจัย และการวางแผนกลยุทธ์ด้านความเป็นนานาชาติของสถาบันอุดมศึกษา

Received: March 1, 2026 Revised: March 22, 2026 Accepted: March 28, 2026 https://doi.org/10.14456/jiskku.2026.1

คำสำคัญ: ความร่วมมือระหว่างสถาบัน เครือข่ายความรู้ การไหลเวียนของความรู้เชิงสถาบัน ความร่วมมือระหว่างประเทศ การวิเคราะห์เครือข่าย

Abstract

Purpose: Internationalization in higher education is increasingly evaluated not only in terms of partnership governance effectiveness but also through the management of institutional knowledge networks embedded within collaboration structures. Memoranda of Understanding (MOUs) serve as foundational instruments for inter-institutional cooperation; however, empirical analyses of how MOU portfolios shape institutional knowledge flow remain limited, particularly at the sub-institutional level.

Methodology: This study examines the MOU portfolio of the College of Arts, Media and Technology (CAMT) at Chiang Mai University through a quantitative analysis of 40 agreements that were signed or remained active between 2023 and early 2026. Integrating a strategic partnership portfolio governance framework with an institutional knowledge flow perspective, the study analyzes geographic distribution, agreement duration, institutional level, lifecycle status, and temporal development patterns. Descriptive statistical techniques and institutional document analysis are employed to identify structural collaboration trends and information governance characteristics.

Findings: The findings indicate that partnership agreements are geographically concentrated in Asia, particularly in China, Japan, and South Korea, reflecting the regional density of knowledge networks. The standardized five-year agreement structure demonstrates alignment in lifecycle governance and supports sustained cycles of knowledge circulation. A balanced dual-level partnership configuration supports multi-layered research information exchange across institutional hierarchies. The upward trend of MOU formation further indicates deliberate expansion of institutional knowledge infrastructure within regional academic ecosystems.

Applications of this study: The results contribute to international affairs management, research data governance, and institutional strategy development in higher education institutions seeking to enhance global collaboration performance.

Keywords: Institutional partnership, Knowledge network, Institutional knowledge flow, International collaboration, Social network analysis

1. Introduction

Internationalization has evolved into a fundamental strategic dimension of contemporary higher education systems. Universities worldwide increasingly engage in cross-border collaboration in response to globalization, the transformation of the knowledge economy, and intensifying competition in global academic rankings. Such collaborations facilitate student and staff mobility, joint research initiatives, curriculum innovation, and transnational knowledge exchange, thereby enhancing institutional visibility and competitiveness in the global higher education landscape.

In operational practice, internationalization strategies are largely implemented through institutional partnership agreements. Among these, Memoranda of Understanding (MOUs) are among the most widely used instruments for formalizing interorganizational collaboration. MOUs typically provide a flexible, low-risk mechanism for initiating partnerships, particularly during the early stages of relationship development, allowing institutions to explore collaborative opportunities without requiring immediate legal or financial commitments.

Despite their widespread adoption, MOUs are often criticized for being symbolic or ceremonial. Without effective governance mechanisms, performance-monitoring systems, and alignment with institutional strategic objectives, MOUs may fail to yield tangible academic or research outcomes. Consequently, recent higher education management scholarship has increasingly emphasized the importance of evaluating not only the number of partnership agreements but also the structural composition and governance quality of institutional collaboration portfolios.

Criticisms of the memorandum of understanding point out that the effectiveness of cooperation depends not only on the agreement itself, but also on the bodies and processes that oversee it in practice. At the operational level, the International Relations Office plays a central role in managing institutional partnerships. It coordinates policy implementation, oversees agreement documentation, manages partnership data, and monitors long-term collaboration performance. This role is not limited to administrative facilitation but directly involves aligning cooperation with the institution's strategy, managing contractual risks, and maintaining the continuity of inter-organizational relationships in a rapidly changing context.

However, the role of the International Relations Office as a manager of an information-based partnership portfolio is not yet clearly reflected in empirical research, particularly in studies using actual cooperation agreements at the sub-unit level within higher education institutions. The lack of such an analytical framework means the potential of public relations

work to support strategic decision-making and oversight of cooperation is not systematically reflected in the academic literature.

Chiang Mai University (CMU) identifies international collaboration as a core strategic pillar supporting its academic development and global engagement agenda. Within CMU, the College of Arts, Media and Technology (CAMT) actively pursues international partnerships aligned with its interdisciplinary academic focus on digital media, creative industries, and technology-driven innovation. Over recent years, CAMT has significantly expanded its domestic and international collaboration networks; however, a systematic evaluation of its partnership portfolio has not been conducted (Chiang Mai University, 2023).

Existing literature on higher education internationalization predominantly focuses on macro-level policy frameworks or case-specific collaborative programs. Empirical analyses examining partnership governance structures at the sub-institutional level remain limited.

This study addresses this research gap by applying a portfolio management perspective to institutional MOU data, reconceptualizing MOUs as governance assets embedded within broader strategic management systems.

Institutional partnership agreements also serve as mechanisms for knowledge diplomacy, enabling universities to participate in transnational academic ecosystems and global innovation networks. In recent years, universities have increasingly recognized that sustainable international collaboration requires systematic monitoring, performance evaluation, and governance alignment rather than symbolic agreement expansion. The transformation of partnership management from administrative coordination toward strategic governance reflects broader shifts in higher education management paradigms.

Furthermore, the rapid digitalization of higher education and the expansion of interdisciplinary academic programs have increased the complexity of institutional collaboration structures. Universities must coordinate partnerships across multiple faculties, research clusters, and industry engagement initiatives. Consequently, institutional partnership portfolios increasingly serve as strategic knowledge infrastructures that support academic development, research productivity, and global reputation-building.

Despite these developments, empirical evidence examining how institutional units manage and structure their partnership portfolios remains limited. Most studies emphasize national policy frameworks or institutional-level performance indicators, leaving sub-institutional collaboration governance largely unexplored. Addressing this gap is essential

because faculty-level collaboration patterns often reflect operational realities and implementation challenges more directly than institutional strategic plans.

1.1 Literature Review and Conceptual Framework

This study proposes a conceptual framework that positions institutional MOU portfolios as strategic governance infrastructures that enable knowledge flow within higher education systems (Altbach & Knight, 2007; Powell et al., 1996). The framework integrates structural, governance, and knowledge-based perspectives to provide a comprehensive analytical lens for examining institutional partnerships.

As shown in Figure 1, at the structural level, MOUs are characterized by key variables, including agreement duration, geographic distribution, institutional level, and lifecycle status. These variables define the configuration and composition of institutional partnership portfolios and reflect governance design principles commonly discussed in higher education internationalization literature.

At the governance level, these structural characteristics are operationalized through mechanisms such as policy alignment, data governance, and standardization of agreements. These mechanisms ensure that partnership activities are systematically coordinated, strategically aligned, and institutionally accountable, which is critical for effective interorganizational collaboration (Borgatti & Halgin, 2011).

Building upon these governance structures, institutional knowledge flow emerges through processes such as research data exchange, academic mobility, and collaborative innovation. In this study, knowledge flow is conceptualized as the dynamic circulation of intellectual and informational resources across institutional boundaries, consistent with network-based perspectives on knowledge exchange (Powell et al., 1996) and knowledge creation theory (Nonaka & Takeuchi, 1995).

Finally, sustained knowledge flow contributes to measurable institutional impact, including the development of internationalized education programs, the expansion of global research and innovation capacity, and the strengthening of industry and government linkages.

By conceptualizing MOU portfolios within this integrated framework, the study moves beyond viewing agreements as symbolic instruments and instead positions them as dynamic systems that facilitate knowledge circulation, support strategic decision-making, and enhance institutional performance.

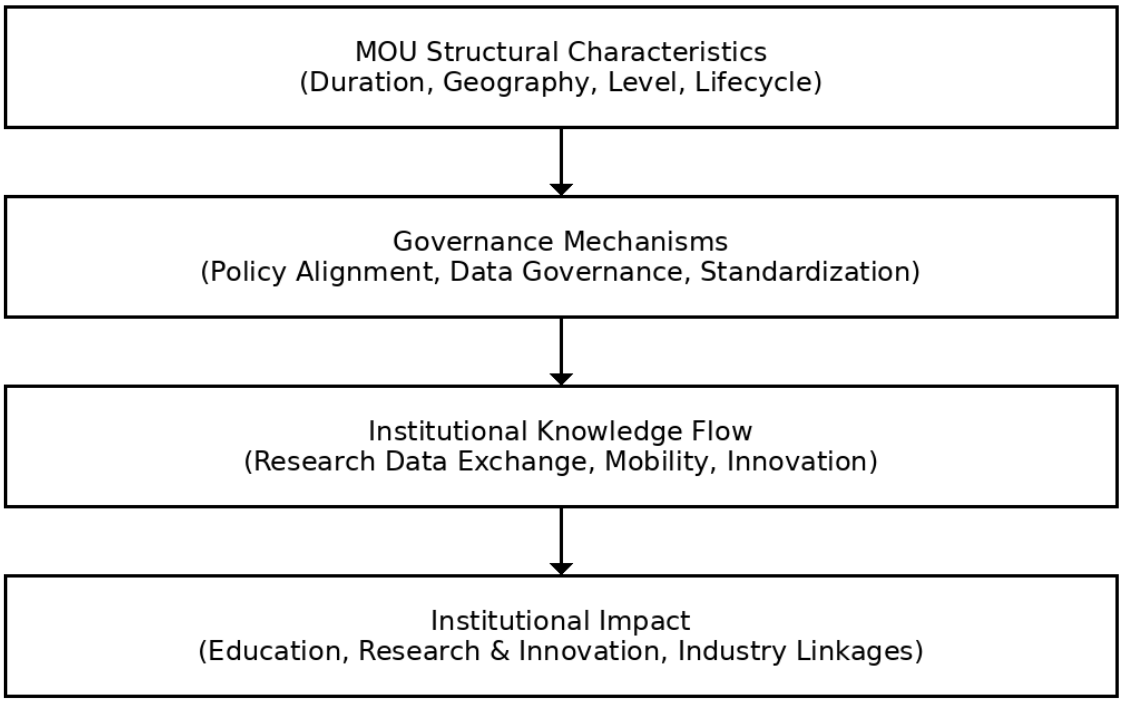


Figure 1. Conceptual Framework of Institutional MOU Portfolio Governance and Knowledge Flow

This integrated framework also enables the identification of structural trends and policy-driven transformations in institutional partnership development over time.

2. Purpose

1) Analyze trends in institutional partnerships in international academic collaboration.
2) Examine the structural characteristics of institutional knowledge networks.
3) Investigate institutional knowledge flow patterns using network indicators.
4) Explore implications for research data management and international affairs strategy.

3. Methodology

3.1 Data Source

This study adopts a quantitative institutional portfolio analysis approach to examine MOU governance structures. The dataset consists of official institutional records documenting 40 MOUs concluded by CAMT between January 2023 and early 2026. The

dataset includes agreements signed, renewed, or actively implemented during the study period.

To ensure data reliability, MOU records were cross-verified with the Chiang Mai University MOU Information System and supporting administrative documentation. Variables were operationalized to capture structural and governance characteristics of partnership agreements, including geographic distribution, agreement duration, institutional level, lifecycle status, and temporal development trends.

3.2 Variables and Definitions

The analysis focuses on the following variables:

Country: Country of the partner institution

Continent: Regional classification of partner institutions (Asia or Europe)

Year: Year in which the MOU was signed or became effective

Duration: Length of the agreement, measured in years

Level: Institutional level of the agreement (University-level or College-level)

Status: Current status of the MOU (In effect or Pending)

These variables are interpreted as structural proxies for institutional knowledge flow.

For example, agreement duration reflects the sustainability of knowledge exchange cycles, while geographic distribution indicates network density and regional clustering effects.

3.3 Data Analysis Techniques

Descriptive statistical analysis was selected as the primary analytical method due to its suitability for identifying institutional portfolio patterns. Frequency distributions, percentage comparisons, and trend visualization were used to identify the dominant structural characteristics of CAMT's partnership portfolio. The analytical approach aligns with exploratory governance studies where strategic pattern recognition is prioritized over causal inference modeling.

Although descriptive statistical analysis is employed as the primary analytical method, the study adopts a governance-oriented portfolio perspective to interpret institutional collaboration structures.

Instead of treating MOUs as isolated bilateral agreements, the analysis conceptualizes partnership agreements as components of an integrated institutional

collaboration portfolio. The analytical framework focuses on structural configuration patterns, lifecycle synchronization, and alignment with institutional internationalization objectives.

This exploratory analytical approach supports institutional governance research that aims to identify strategic configuration patterns rather than causal performance determinants.

Furthermore, descriptive portfolio analysis provides baseline institutional intelligence that can inform subsequent advanced analytical approaches, including network analysis, collaboration performance evaluation, and predictive modeling of partnership sustainability.

4. Research results

4.1 Geographic Distribution of Partnerships

The empirical findings indicate that CAMT's partnership portfolio shows a pronounced regional concentration in Asia, accounting for more than three-quarters of the total agreements analyzed, as shown in Figure 2. Domestic partnerships constitute the largest single-country category, highlighting the importance of intra-national collaboration in supporting institutional academic networks and resource sharing.

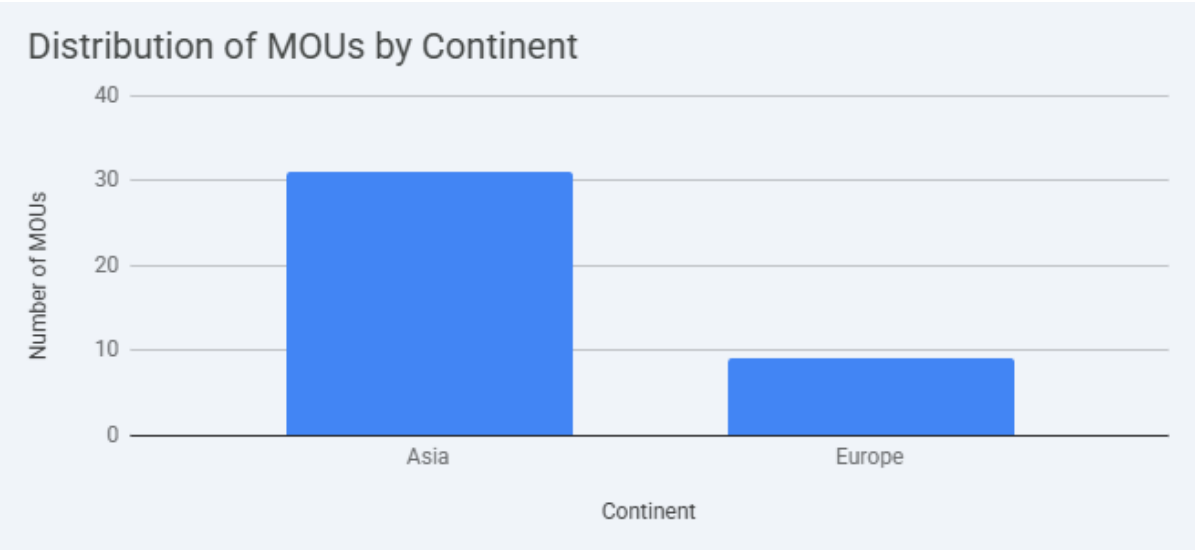


Figure 2. Distribution of MOUs by Continent

Among international partners, South Korea, China, and Japan are the most dominant, as shown in Figure 3. These countries represent significant regional higher education hubs with strong technological research capacity and established academic exchange networks. The presence of European partnerships, although comparatively limited, suggests diversification of collaboration beyond regional boundaries.

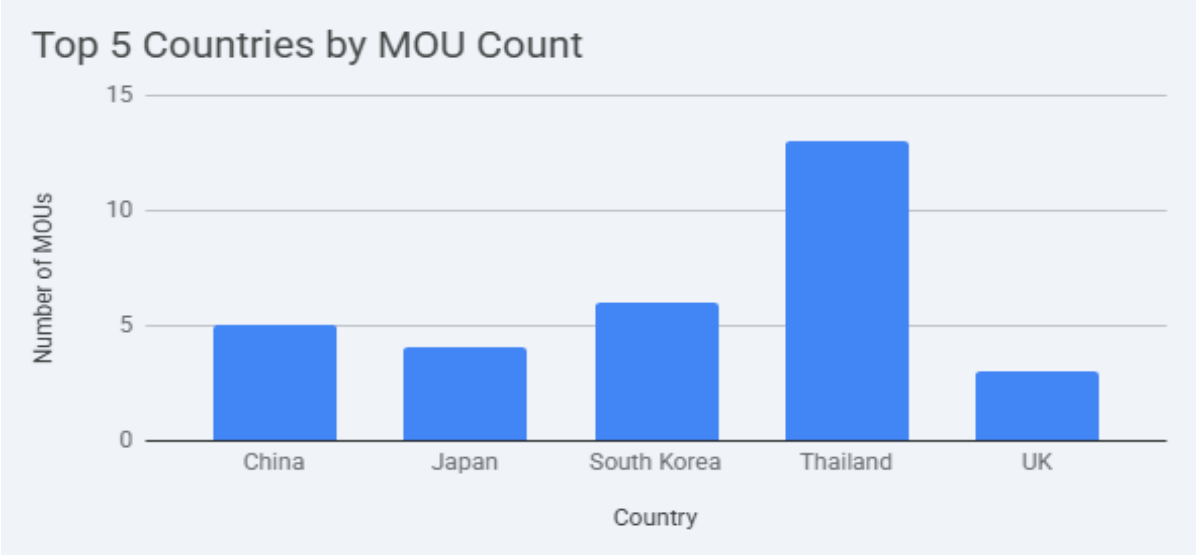


Figure 3 Top Five Countries by MOU Count

4.2 Temporal Trends in MOU Formation

Temporal analysis indicates a progressive increase in MOU formation throughout the study period, reflecting institutional expansion of collaboration networks, as shown in Figure 4. The apparent decline in 2026 agreement numbers is attributable to differences in data collection timing rather than actual partnership contraction, suggesting continued growth in collaboration.

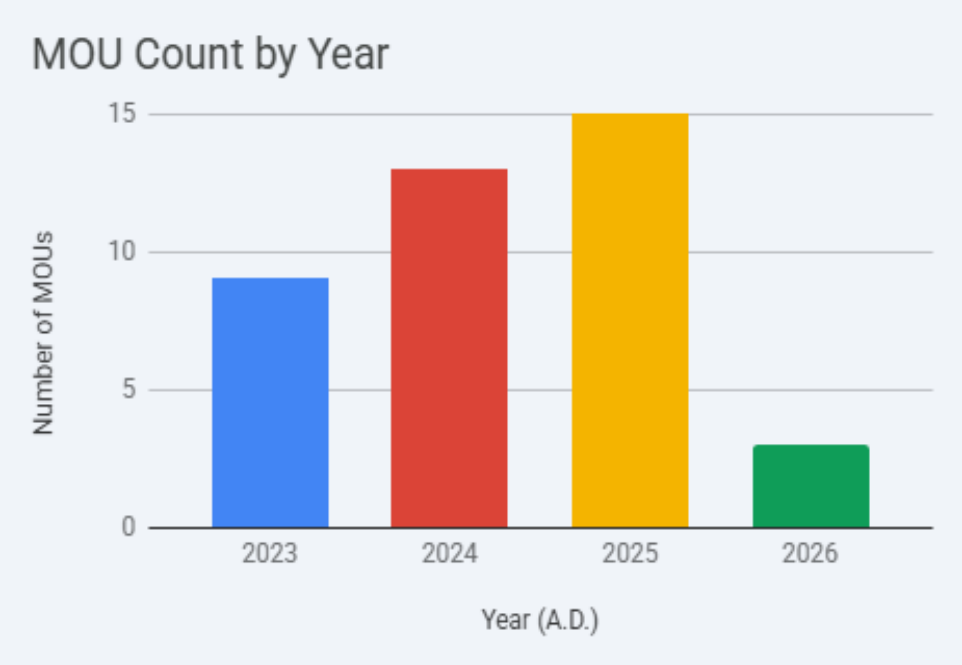


Figure 4 MOU Count by Year

4.3 Agreement Duration and Institutional Level

Agreement duration analysis reveals a strong institutional preference for standardized five-year agreements, as shown in Figure 5. This pattern indicates governance strategies emphasizing medium-term stability while maintaining flexibility for periodic evaluation and renewal.

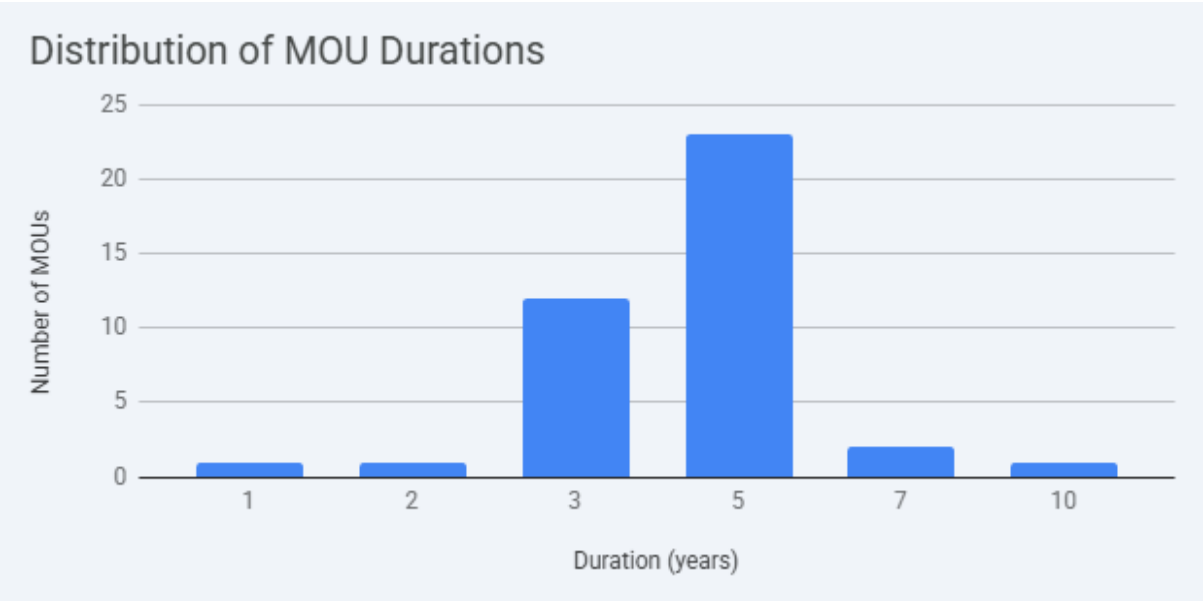


Figure 5 Distribution of MOU Durations

At the institutional level, the MOUs are evenly divided between University-level and College-level agreements. This balance reflects a dual-track partnership strategy that combines broad institutional collaboration with more specialized, discipline-focused initiatives.

4.4 Agreement Status

The majority of MOUs (35 out of 40) are currently in effect, indicating a high rate of successful finalization and implementation. Only a small proportion remains pending, suggesting efficient administrative processes and effective coordination among stakeholders.

4.5 Portfolio Balance and Strategic Diversification

Beyond structural distribution, the MOU portfolio demonstrates evidence of strategic diversification across academic collaboration types. The coexistence of domestic and international partnerships indicates that CAMT pursues a dual-network collaboration strategy. Domestic agreements support curriculum benchmarking, resource sharing, and localized research collaboration, while international partnerships expand academic visibility and research capacity through cross-border knowledge exchange.

The portfolio also reflects diversification in institutional partnership levels. University-level agreements create broad collaboration platforms that facilitate interdisciplinary cooperation, while college-level agreements allow for specialized academic engagement tailored to CAMT’s disciplinary strengths. This multi-layered portfolio configuration enhances institutional resilience by reducing dependency on a limited number of partnership channels.

4.6 Specific Activities and Institutional Impact

Although this study is limited by sample size, an in-depth analysis of the specific content and activities under the MOUs demonstrates that the institution can generate concrete and profound institutional impacts across three main dimensions.

4.6.1 Internationalized Education

The institution has developed seamless educational mechanisms through Double Degree Programs with leading global universities such as Oxford Brookes University in the UK, Edinburgh Napier University, and Lunghwa University of Science and Technology in Taiwan. It also co-created a Microdegree program in games and animation with Chung-Ang University in South Korea, which enhances students' competencies in the global labor market.

4.6.2 Global Research & Innovation

The institution has successfully accessed international research funding, such as the Erasmus+ grant from the European Union through the INNO4Tourism project with the University of Florence and the University of Palermo in Italy. This also includes the Zero Waste in Tourism project with Chengdu University in China and Harokopio University of Athens in Greece. Additionally, there are in-depth research collaborations in Health Tech and Artificial Intelligence with Imperial College London and Taipei Medical University.

4.6.3 Industry and Government Linkage

Applying technology and research to solve real-world societal problems is a prominent outcome. Examples include developing an AI CCTV system with the Tourist Police Bureau, driving Smart City initiatives with the Digital Economy Promotion Agency (DEPA) and Bedrock Analytics Co., Ltd., developing cybersecurity human resources with the National Cyber Security Agency (NCSA), and conducting logistics research with the Federation of Thai Industries.

5. Conclusion

This study demonstrates that institutional MOU portfolios can be systematically analyzed as strategic governance infrastructures supporting higher education internationalization. The CAMT case illustrates a regionally concentrated collaboration model, standardized lifecycle governance mechanisms, and a dual-level partnership structure that collectively reflect strategic institutional alignment.

The study highlights the managerial importance of transitioning from quantitative partnership expansion toward performance-oriented portfolio governance. Institutions that rely solely on increasing agreement numbers risk symbolic internationalization without measurable academic outcomes.

By conceptualizing MOU portfolios as strategic governance infrastructures, this study extends the analytical scope of higher education internationalization research beyond symbolic partnership formation toward measurable knowledge-based outcomes.

Positioning institutional MOUs within a knowledge network framework expands the analytical scope beyond administrative governance. Partnership portfolios function as infrastructures of knowledge circulation that shape research data exchange, scholarly mobility patterns, and collaborative innovation trajectories. Embedding information governance metrics

into partnership evaluation systems is therefore essential for sustainable, impact-driven internationalization.

This study contributes to higher education internationalization research by introducing a portfolio governance analytical framework applicable to sub-institutional collaboration analysis. These findings reinforce the strategic value of systematic partnership portfolio governance in enhancing institutional internationalization outcomes. The framework provides practical tools for institutional administrators to evaluate partnership structures and supports evidence-based internationalization planning.

6. Discussion

6.1 Structural Network Density and Collaborative Knowledge Exchange

The findings suggest that CAMT's partnership strategy reflects deliberate regional clustering rather than opportunistic agreement formation. Regional concentration enhances operational efficiency by reducing administrative complexity, travel constraints, and cultural communication barriers.

Regional clustering may also increase network density within the institutional collaboration ecosystem. From a knowledge network perspective, higher network density strengthens repeated interactions, trust formation, and the efficiency of information exchange among partner institutions. Such dense collaboration structures facilitate sustained research knowledge flows, co-publication opportunities, and the diffusion of tacit knowledge across academic communities (Cross et al., 2002; Powell et al., 1996). Consequently, CAMT's regional concentration strategy may function not only as an operational efficiency mechanism but also as a structural enabler of institutional knowledge circulation.

The predominance of standardized five-year agreement durations indicates institutional efforts to synchronize partnership lifecycle management with strategic planning cycles. Standardization facilitates systematic performance evaluation and decision-making on renewal, thereby improving transparency in governance and administrative coordination.

The balanced distribution between university-level and college-level agreements reflects a multi-layered governance structure that enables strategic flexibility. University-level agreements provide institutional legitimacy and broader collaboration frameworks, while college-level agreements allow discipline-specific innovation and targeted academic cooperation.

Importantly, the findings highlight the transformation of MOUs from symbolic diplomatic instruments into strategic governance tools embedded within institutional management systems. Effective partnership portfolio governance requires integrated monitoring mechanisms, outcome-based performance indicators, and data-driven decision-making frameworks.

From a governance perspective, the observed partnership patterns illustrate how institutional collaboration portfolios evolve through strategic filtering processes. Institutions gradually refine partnership selections based on resource capacity, academic compatibility, and performance outcomes. The presence of standardized agreement durations suggests institutional efforts to create predictable governance cycles that facilitate evaluation, renegotiation, and strategic realignment. When considering the trends of academic partnership agreements between the institution and its international networks over time, clear policy developments emerge. In the early stages (e.g., around 2018), the MOU structures were often broad frameworks aimed at establishing foundational networks, student exchanges, and general academic and staff mobility, such as the agreements with Nara Institute of Science and Technology (NAIST) and the University of Bremen. However, the direction and trends of MOUs in the current and future periods (2023-2026) have shifted towards greater specialization and a more practical orientation. Activities under recent MOUs are designed to directly align with digital industry problem-solving, such as organizing international Hackathons, developing Cross-Border E-Commerce (CBEC) skills with institutions in China, and hosting specialized seminars on Human-Centric AI. These developments reflect the dynamism of higher education institutions striving to drive knowledge to respond promptly to global technological and digital economy transformations.

Moreover, the findings highlight the importance of administrative coordination mechanisms in sustaining partnership effectiveness. Successful implementation of MOUs requires cross-functional collaboration among academic departments, international offices, and executive leadership. The absence of such coordination often results in inactive agreements despite formal documentation.

The findings also emphasize the growing importance of digital partnership management systems in supporting institutional collaboration governance. Integrated data platforms enhance monitoring efficiency, facilitate performance tracking, and support evidence-based decision-making in implementing internationalization strategies.

These findings are consistent with network theory, which suggests that dense and regionally clustered networks enhance knowledge diffusion and collaborative efficiency (Powell et al., 1996). Furthermore, the observed patterns align with knowledge creation theory, which holds that sustained interaction and repeated collaboration contribute to the development of institutional knowledge assets (Nonaka & Takeuchi, 1995).

6.2 Institutional Knowledge Flow Implications

Beyond structural governance considerations, the findings suggest that CAMT's partnership portfolio operates as a regional knowledge network architecture. The geographic concentration of agreements in Asia indicates the formation of a dense knowledge-exchange ecosystem characterized by recurring academic interactions and reduced coordination barriers.

From an information science perspective, such a concentration may facilitate accelerated diffusion of tacit knowledge, improved synchronization of research activities, and more efficient data-sharing mechanisms. The predominance of five-year agreements supports sustained knowledge production cycles aligned with research funding and publication timelines.

Importantly, institutional administrators should consider integrating MOU portfolio databases with research information management systems to enable evidence-based monitoring of knowledge flow outcomes. Linking partnership agreements with co-publication records, joint grant data, and mobility statistics would enable institutions to assess knowledge circulation performance rather than merely the quantity of agreements.

This integration represents a shift from symbolic partnership accumulation toward measurable institutional knowledge governance.

6.3 Organizational Policy and MOU Trends

The evolution and trends of these MOUs are fundamentally driven by the organizational policies of Chiang Mai University (CMU) and the College of Arts, Media and Technology (CAMT) across different periods. Historically, early policy objectives focused on broad academic networking and general student mobility. However, in line with CMU's recent strategic focus on proactive internationalization, specifically the CMU Educational Development Plan Phase 13, and its goal to become a Tier 1 research university, CAMT's partnership policy has shifted. The origin of MOUs in the current period (2023-2026) stems directly from organizational directives to build a high-level digital workforce, drive Smart City initiatives, and foster Cross-Border E-Commerce (CBEC) ecosystems. Consequently, the trends of recent MOUs reflect this precise policy shift, moving away from general academic exchanges

toward highly specialized, practical-oriented collaborations. This is evidenced by the recent strategic agreements emphasizing Double Degree Programs, Human-Centric AI, and Global Hackathons, demonstrating how organizational policy directly shapes the structural trends and specific content of institutional partnerships.

7. Acknowledgement

The author would like to express sincere appreciation to the Dean, Vice Dean, the head of administration, and colleagues from the Research and International Relations Office of the College of Arts, Media and Technology, Chiang Mai University, for their continuous support and encouragement in advancing research initiatives. Their commitment to fostering an enabling academic environment and providing opportunities for research development and scholarly presentation has been instrumental in the completion of this study.

References

Altbach, P. G., & Knight, J. (2007). The internationalization of higher education: Motivations and realities. **Journal of Studies in International Education, 11**(3–4), 290–305. https://doi.org/10.1177/1028315307303542

Borgatti, S. P., & Halgin, D. S. (2011). On network theory. **Organization Science, 22**(5), 1168–1181. https://doi.org/10.1287/orsc.1100.0641

Chiang Mai University. (2023). **Memorandum of understanding database** [Dataset]. College of Arts, Media and Technology.

Cross, R., Borgatti, S. P., & Parker, A. (2002). Making invisible work visible: Using social network analysis to support strategic collaboration. **California Management Review, 44**(2), 25–46. https://doi.org/10.2307/41166121

Knight, J. (2003). Updated Definition of Internationalization. **International Higher Education, 33**(33). https://doi.org/10.6017/ihe.2003.33.7391

Nonaka, I., & Takeuchi, H. (1995). **The knowledge-creating company: How Japanese companies create the dynamics of innovation.** Oxford University Press.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. **Administrative Science Quarterly, 41**(1), 116–145. https://doi.org/10.2307/2393988