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Global metrics, local realities: STEAM faculty research in Philippine SUCs

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ABSTRACT

This study aimed to evaluate the research engagement of STEAM faculty in Philippine State Universities and Colleges (SUCs) by applying the Commission on Higher Education (CHED) Researcher Classification Framework and the Department of Science and Technology (DOST) Scientific Career System. A convergent parallel mixed-methods design was employed, combining quantitative data on ISI- and Scopus-indexed publications, authorship patterns, research supervision, and training participation with survey responses from STEAM faculty members across five SUCs in Region II. Qualitative insights from administrators, research directors, and faculty narratives complemented the survey data. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative interviews underwent thematic content analysis. Findings show that SUCs 1 to 3 generally meet CHED's First Stage Researcher category and DOST's Scientist I–II level, though none have advanced to higher classifications. By contrast, SUCs 4 and 5 exhibit deeper gaps, with no faculty members qualifying under either framework, despite having a relatively high number of master's degree holders. Barriers across institutions include limited publication output, inconsistent mentoring, and insufficient institutional support for sustained research leadership. The study concludes that promoting inclusive, performance-oriented research requires strategies that align national goals with faculty development and match institutional practices to global academic standards.

Contribution/Originality: This study provides one of the first dual-framework assessments of STEAM faculty research engagement in Philippine State Universities and Colleges (SUCs). By combining institutional metrics with faculty perspectives, it identifies gaps in productivity, mentoring, and structural support, and offers insights for policy reforms that connect global standards with local realities.

1. INTRODUCTION

In the knowledge-based economy, research plays an increasingly vital role. Rankings such as QS and Times Higher Education (THE) place substantial weight on publications, citations, research funding, and international collaboration (Doğan & Arslan, 2024; Park, Sanchez, & Zuban, 2022; Qamar, 2024). These international benchmarks emphasize the importance of faculty research output not only for institutional prestige but also for a country's innovation standing. As a result, nations are encouraged to strengthen their research ecosystems through policy reforms and capacity enhancement. However, in the Global South, persistent structural challenges include limited faculty training, underdeveloped research infrastructure, and a lack of ongoing scholarly incentives (Atibuni, 2020; Carcamo, Pino, & Johnson, 2025; Nguyen, 2020).

In the Philippines, State Universities and Colleges (SUCs) are required under Republic Act No. 7722 and key Commission on Higher Education (CHED) policies to provide instruction, conduct research, and engage in extension activities (Republic of the Philippines, 1994). CHED's National Higher Education Research Agenda (NHERA II) and CMO No. 52 s.2016 highlight institutional support for developing a research culture (Commission on Higher Education, 2009; Commission on Higher Education (CHED), 2016) while the Department of Science and Technology (DOST), through its Scientific Career System (SCS), classifies researchers based on peer-reviewed outputs, innovation, and long-term scientific contributions (Department of Science and Technology (DOST) & Civil Service Commission (CSC), 2011). Despite these frameworks, Philippine HEIs continue to be underrepresented in global indices; the 2024 Global Innovation Index ranks the country 57th out of 113 nations, pointing to weaknesses in knowledge creation and technological progress (World Intellectual Property Organization, 2024).

Existing Philippine studies have examined research productivity, institutional incentives, and faculty development in various SUCs (Bayudan-Dacuycuy, Flores, & Uy, 2024; Roman, 2021). These works reveal ongoing gaps in the alignment of mentoring, performance evaluation, and researcher classification. However, most studies focus on national data or NCR institutions, which limits understanding of regional differences. Research conducted in Visayas and Mindanao SUCs (Amoto, Sodusta, Fernandez Jr, Firmase, & Nanta, 2024; Palmiano, 2024; Torrentira Jr, 2019) provides valuable insights into their unique institutional cultures, but their contexts differ considerably from Northern Luzon. Despite Region II's growing number of STEAM faculty and infrastructure, it remains understudied, highlighting a significant gap in understanding how faculty in peripheral SUCs manage national mandates within local contexts.

While policy frameworks by CHED and DOST are well-defined, their implementation across SUCs varies significantly. More importantly, there is limited empirical evidence on how faculty, especially those in STEAM (Science, Technology, Engineering, Agriculture, and Mathematics) disciplines, engage with these mandates in practice. Additionally, local efforts to meet CHED and DOST benchmarks should be evaluated in relation to global standards established by international bibliometric systems. This study addresses these gaps by examining the research engagement of STEAM faculty in Philippine SUCs and placing findings within both national frameworks and global expectations.

Region II (Cagayan Valley) presents a significant site for studying faculty research engagement. Commission on Higher Education Region II (2021) reports an increasing number of doctorate and master's degree holders, including 249 in Isabela and 190 in Cagayan, while CHED's HEMIS platform formalizes the tracking of these indicators (Commission on Higher Education Region II, 2021). Additionally, the region's active involvement in CHED- and DOST-funded projects, such as regional contributions to multimillion-peso R&D initiatives like the externally funded projects for Quirino State University (QSU), Isabela State University (ISU), Nueva Vizcaya State University (NVSU), and Cagayan State University (CSU), indicates growing institutional capacity (Cagayan State University–Sanchez Mira Campus, 2025; Isabela State University, 2021; Nueva Vizcaya State University, 2025; Quirino State University, 2022). Yet, research output and systemic support still vary widely, requiring targeted investigation. Lessons from similar countries in the Global South, such as Vietnam, Uganda, and Chile, highlight common challenges, including concentrated research activity, insufficient mentorship, and limited access to publication funding (Atibuni, 2020; Carcamo et al., 2025; Nguyen, 2020), emphasizing the importance of this regional study.

This study aims to evaluate the research engagement of STEAM faculty in Philippine state universities and colleges through the lens of the CHED Researcher Classification Framework and the DOST Scientific Career System. This study focuses on four main objectives. It aims to profile the current research productivity of STEAM faculty in Region II SUCs using the DOST Scientific Career System classification. It also examines faculty competencies and qualifications in relation to the CHED Researcher Classification Framework. In addition, the study explores institutional and systemic factors that either enable or hinder progress in research classifications. Finally, it compares

local patterns of faculty research engagement with global standards and practices observed in comparable national systems.

Taken together, these objectives provide a multidimensional understanding of how regional SUCs can align institutional realities with CHED and DOST policies while strengthening their capacity for equitable and globally engaged research.

This paper is structured as follows. The next section reviews global and Philippine perspectives on research culture and performance metrics, followed by the methodology, which details the convergent parallel mixed methods approach employed in the case of SUCs in Region II. The results integrate quantitative and qualitative evidence to identify institutional strengths and challenges. The discussion situates these findings within international benchmarks and national policy frameworks, and the conclusion advances a catalytic framework to strengthen research culture in STEAM disciplines.

2. REVIEW OF RELATED LITERATURE

2.1. Defining Research Engagement and Productivity in Global and Local Contexts

Faculty research engagement goes beyond publishing articles. It involves the active participation of academics in creating, sharing, and applying knowledge through activities such as mentoring, writing grants, collaborating across disciplines, and translating research into practice (Fleming, 2023; Hazzan & Lis-Hacohen, 2016). globally, productivity is often assessed through outputs such as peer-reviewed publications, patents, citation counts, funded projects, and membership in research networks (Hung & Lin, 2022; Lee, 2015; Veldandi, Babu, Naik, & Sagar, 2023). These are then linked to bibliometric indicators such as the h-index, CiteScore, and Scopus indexing, which are used in rankings like QS, Times Higher Education (THE), and the Global Innovation Index (Baas, Schotten, Plume, Côté, & Karimi, 2020; Mustafa et al., 2023). Critics, however, point out that such measures favor Global North institutions and overlook the value of interdisciplinary or context-based scholarship in underrepresented regions (Koltun & Hafner, 2021; Mustafa et al., 2023).

In the Philippines, two systems guide research classification: the CHED Researcher Classification Framework and the DOST Scientific Career System (SCS) (Commission on Higher Education (CHED), 2016; Department of Science and Technology (DOST) & Civil Service Commission (CSC), 2011). The CHED framework identifies four levels: First Stage, Early Career, Established, and Leading, based on qualifications, authorship, and policy alignment. The DOST SCS, administered by the Civil Service Commission, categorizes faculty from Scientist I to V according to outputs such as refereed publications, patents, and societal contributions. While both aim to strengthen research quality, DOST emphasizes measurable scientific rigor, whereas CHED highlights developmental pathways that include mentorship, grant acquisition, and extension services. This study applies both systems to examine the research status of STEAM faculty in Region II SUCs.

2.2. Global Metrics, Performance Disparities, and Emerging Paradigms

Research productivity is closely linked to the academic hierarchies that shape faculty engagement. In countries such as the UK, Japan, Bangladesh, and the Philippines, bibliometric indicators are widely used in national evaluation systems. Measures like field-weighted citation impact (FWCI), SCImago Journal Rank (SJR), and the h-index serve as benchmarks for assessing both institutional performance and individual researcher output (Li & Yin, 2022; Tran, Trinh, Le, Hoang, & Pham, 2020). However, significant disparities remain. For instance, Armenia reports only 28.3% of WoS-indexed publications compared to Italy's 98% (Abramo, D'Angelo, Gzoyan, & Sargsyan, 2025). Similarly, the University of Jaffna in Sri Lanka still lacks a significant presence in global rankings due to limited access to journals and institutional resources (Janen, 2023). These disparities often result from language barriers, funding shortages, and inadequate research infrastructure (Castulo, 2024; Islam, 2024). Traditional metrics like the h-index and Scopus indexing have faced widespread criticism for favoring institutions in the Global North while neglecting context-

specific research from the Global South (Koltun & Hafner, 2021; Mustafa et al., 2023). In the Philippines, concerns about "Scopus-centrism" are well documented (Juan, 2024), especially as CHED mandates Scopus-recognized outputs through CMO 15 s. 2019 (Commission on Higher Education, 2019). Yet, applying global standards without sufficient institutional support results in uneven outcomes across regions. As CHED's NHERA II and DOST's SCS emphasize, metrics should be adapted to local contexts (Commission on Higher Education, 2009; Department of Science and Technology (DOST) & Civil Service Commission (CSC), 2011), particularly where regional SUCs face heavy teaching loads, weak mentoring systems, and limited access to research funding.

Critiques of these global metrics have led to calls for more inclusive indices. Traditional measures like the h-index ignore disciplinary differences and collaborative authorship, resulting in proposals for more representative alternatives such as the E-index or Woginger index (Mustafa et al., 2023). Koltun and Hafner (2021) also argue that the h-index no longer accurately captures scientific reputation in today's interdisciplinary research environments.

2.3. Bibliometric Systems in the Global South: Scopus-Centrism and Structural Gaps

Developing countries often face systemic challenges in meeting global research standards. In the Philippines, scholars have expressed concerns about "Scopus-centrism," where emphasis on international indexing sidelines local languages and indigenous knowledge (Juan, 2024). CHED's mandate for Scopus-recognized outputs through CMO 15 s. 2019 has pressured SUCs to meet standards without necessarily providing sufficient publishing infrastructure or research support systems (Castulo, 2024).

These challenges are observed worldwide. In Russia, even with SciVal, citation growth remains stagnant due to a lack of policy support (Avanesova & Shamliyan, 2018). Bangladesh faces similar issues with insufficient funding and limited mentorship (Islam, 2025). Researchers in Türkiye, Vietnam, and Armenia contend with language barriers and limited access to research grants (Maral, 2024; Tran et al., 2020). In Latin America and Sub-Saharan Africa, crucial local research is often excluded from WoS or Scopus because of narrow evaluation standards (Asubiaro, Onaolapo, & Mills, 2024; Do Canto, Pinto, Gavron, & Talau, 2022). These patterns highlight the dangers of applying global standards without considering local research systems.

2.4. Southeast Asia's Push for Contextualized Metrics

Across Southeast Asia, institutions are testing context-aware evaluation systems. In the Philippines, Lunag Jr et al. (2024) stress that research ecosystems should give attention to faculty competence and strategic leadership rather than focusing only on publication counts. Similarly, Abdullah Sani et al. (2024) in their bibliometric study of ASEAN Library and Information Science research, they found that Singapore and Malaysia gained stronger citation influence than Indonesia, even though their total outputs were comparable. This finding illustrates that research impact cannot be measured by quantity alone.

A more context-sensitive perspective also recognizes the importance of multilingual scholarship, indigenous knowledge, and applied research. By valuing these forms of contribution, such approaches help prevent the exclusion of faculty based in underserved regions or in STEAM disciplines, where application and collaboration are more central than producing large numbers of publications.

2.5. Regional Underrepresentation: The Case of Region II SUCs

Although research on productivity in the Philippines has grown, Region II is still seldom represented. Prior work in Central Luzon (Rogayan Jr & Corpuz, 2022), Laguna (Callo & Sahagun, 2019) and Benguet (Launio et al., 2024) has identified institutional factors that support research engagement. However, Region II, which covers the provinces of Isabela, Cagayan, Quirino, Nueva Vizcaya, and Batanes, rarely appears in national-level analyses (Bayudan-Dacuycuy et al., 2024; Condez, 2024). This omission is striking, given the steady increase in doctoral faculty and the

rise of funded projects in institutions such as Isabela State University (Commission on Higher Education Region II, 2021; Philippine Council for Agriculture Aquatic and Natural Resources Research and Development, 2024).

ISU has been recognized by EDCOM 2 as a second-tier research-intensive state university (Demeterio et al., 2024), but it lags behind its peers, such as CTU and CLSU. Moreover, the lack of studies focusing on STEAM disciplines in Region II, particularly agriculture, engineering, computing, and marine sciences, limits the understanding of context-specific barriers to research engagement. This study addresses that gap by applying CHED-DOST frameworks to analyze how faculty in these disciplines navigate research expectations.

2.6. Toward Inclusive Metrics and SDG-Linked Research Frameworks

Emerging frameworks are increasingly aligning research productivity with the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education) and SDG 9 (Industry, Innovation, and Infrastructure). Institutions leverage open-access journals like MDPI's *Sustainability* to boost visibility and FWCI scores (Bédard-Vallee, James, & Roberge, 2023). Fractional authorship and normalized citation models are also gaining ground as more equitable alternatives to inflated authorship metrics (Koltun & Hafner, 2021).

These reforms highlight the importance of tailoring evaluation frameworks to local contexts. For SUCs, linking CHED and DOST standards with international benchmarks will mean adjusting core structures, for example, strengthening mentorship, easing teaching loads, and widening access to research funding. Without these, efforts to meet global metrics risk reinforcing exclusion rather than promoting equity. Moreover, aligning with SDG frameworks offers a path for research to support both institutional visibility and societal impact in a meaningful way.

2.7. CHED and DOST Research Frameworks: Alignment, Gaps, and Opportunities

CHED has issued key mandates, as indicated by CMO Nos. 52 s. 2016 and 15 s. 2019, to incorporate research into SUC performance metrics. These include ETL systems, internal grants, and classification into four researcher levels (Commission on Higher Education, 2019; Commission on Higher Education (CHED), 2016). However, implementation remains inconsistent. Faculty from Northern Luzon and Visayas report limited ETL credits, bureaucratic grant procedures, and weak mentoring systems (Velasco, 2024; Wa-Mbaleka & Gomez, 2017).

Meanwhile, the DOST Scientific Career System classifies faculty as Scientist I–III based on publication metrics, innovation outputs, and societal impact (Department of Science and Technology (DOST) & Civil Service Commission (CSC), 2011). However, participation remains low due to heavy teaching loads, lack of mentoring, and limited institutional support (Amoto et al., 2024; Perez et al., 2022). Examples from other countries illustrate the value of structured support systems. Germany's Excellence Initiative and South Korea's Global Physician–Scientist Program both emphasize mentorship, protected research time, and international collaboration (Eom, Kim, Kim, Choi, & Lee, 2025; Hendriks & Reinhart, 2023). Malaysia's MyRA model provides an alternative approach by combining performance indicators with developmental support to create a more inclusive research environment (Nasir, Razaki, Kamil, Razak, & Yahya, 2024). For Philippine SUCs, adopting lessons from these models means aligning CHED and DOST frameworks with international best practices while adapting them to local institutional contexts, so that research development pathways remain relevant, accessible, and equitable.

3. METHODOLOGY

3.1. Research Design

This study used a convergent parallel mixed-methods design to examine the research engagement of STEAM faculty in Philippine State Universities and Colleges (SUCs). Quantitative and qualitative data were collected simultaneously, analyzed separately, and then integrated during interpretation to enhance triangulation and provide contextual insights.

The quantitative strand focused on ISI- and Scopus-indexed publications, authorship patterns, research supervision, and participation in training, using survey responses from faculty in five SUCs in Region II. The qualitative strand drew on interviews with administrators, research directors, and faculty, with narratives analyzed thematically to capture motivations and policy-related constraints affecting research productivity.

This dual approach was guided by global performance indicators such as Scopus and Web of Science, alongside national benchmarks set by the Commission on Higher Education (CHED) and the Department of Science and Technology (DOST). The design follows Creswell and Clark (2018), who emphasize integrating complementary forms of evidence to better understand complex educational issues. By using this framework, the study generated both statistical findings and rich contextual accounts to inform policy, practice, and institutional development.

3.2. Locale and Sampling

This study was conducted across State Universities and Colleges (SUCs) in Region II, also known as Cagayan Valley. The region has recently been noted for the rise in doctoral-level faculty and its active role in CHED- and DOST-funded research. Data from CHED's Higher Education Management Information System (HEMIS) show notable growth in doctoral credentialing, with Isabela reporting 249 doctorate holders and Cagayan 190 (Commission on Higher Education Region II, 2021). Alongside this increase, Region II has been involved in several multi-million-peso research and development projects. Institutions such as ISU, QSU, NVSU, and CSU have received support from CHED and DOST, reflecting the expanding research profile of higher education institutions in the region (Cagayan State University–Sanchez Mira Campus, 2025; Isabela State University, 2021; Nueva Vizcaya State University, 2025; Quirino State University, 2022).

The EDCOM 2 report (Demeterio et al., 2024) identifies Isabela State University (ISU) as a second-tier research-focused State University and College (SUC), predicting substantial growth in STEAM-related fields such as engineering, computer science, and molecular biology. Despite these progressions, Region II remains largely absent from detailed national studies (e.g., (Bayudan-Dacuycuy et al., 2024; Condez, 2024) highlighting ongoing regional invisibility, the lack of localized data, and targeted policy framing positions Region II as a key area for academic exploration. Additionally, by focusing specifically on STEAM faculty, this study fills a secondary gap in the literature: the lack of research on how applied and technical disciplines overcome unique research barriers and develop pathways.

A purposive sampling method was used to select participants who met these criteria: (a) full-time employment in a STEAM field (Science, Technology, Engineering, Agriculture/Fisheries, or Mathematics); (b) holding an academic or research-related role (e.g., Faculty Researcher, Program Chair, Research Director); and (c) demonstrating involvement in CHED- or DOST-recognized research activities. Out of 510 eligible faculty members, 270 participated, yielding a response rate of 52.9%. The sample included a diverse range of institutional types, academic ranks, and disciplines, and was adequate for achieving data saturation. Although purposive sampling does not aim for generalizability, it improves relevance and transferability, especially in policy-focused educational research (Palinkas et al., 2015).

3.3. Research Instrument

Data were collected using a researcher-developed structured questionnaire that integrated both quantitative and qualitative components to provide a comprehensive understanding of faculty research engagement. The instrument consisted of three main sections. The first section collected demographic information, including sex, academic rank, highest educational qualification, STEAM discipline, institutional designation, and years of service. These variables helped contextualize engagement patterns across different faculty profiles. The second section focused on quantitative indicators aligned with the CHED and DOST researcher classification systems. It assessed five key areas: (1) publication records, including outputs in Scopus, Web of Science, and CHED-recognized journals; (2) type of authorship, whether solo, local collaborative, or international collaborative; (3) number of undergraduate and

graduate theses or dissertations supervised; (4) participation in research-related training over the past five years; and (5) alignment with CHED and DOST researcher typologies based on documented outputs.

The third section included open-ended questions exploring faculty experiences related to research challenges, institutional environments that support research, and perceptions of national and international benchmarks. Participants were also encouraged to offer recommendations for strengthening research culture within their institutions. Notably, themes related to research competencies such as computational ability, research communication, innovation leadership, and grant writing emerged naturally from the narrative responses. These qualitative insights were later triangulated with documented research outputs, including publications, funded projects, presentations, and intellectual property contributions, thereby enhancing the interpretive depth and credibility of the findings.

3.4. Instrument Validation and Reliability

To ensure the instrument's quality and methodological rigor, a multi-stage validation process was used. First, content validation involved two rounds of expert review with ten senior faculty members and research directors from Region II SUCs. A panel of experts reviewed each item for clarity, relevance, and alignment with CHED's CMO No. 15, series of 2016, and the DOST Scientific Career System (Commission on Higher Education (CHED), 2016; Department of Science and Technology (DOST) & Civil Service Commission (CSC), 2011). Their comments guided revisions that improved construct coverage, item coherence, and contextual fit.

Pilot testing was carried out in two phases. The first involved non-STEAM faculty from Region II, who evaluated clarity of wording, appropriateness of language, and technical usability. The second involved STEAM faculty from SUCs outside Region II, allowing the tool to be assessed for regional adaptability and cross-institutional relevance.

Reliability testing was undertaken by the College of Statistics at the University of the Philippines Los Baños. Cronbach's alpha values for all subscales were above 0.70, demonstrating strong internal consistency and acceptable psychometric performance, consistent with established benchmarks (Tavakol & Dennick, 2011).

3.5. Data Collection Procedures

Data were gathered over three months using both paper-based and digital tools, such as Google Forms and secure fillable PDFs. The research offices of the participating SUCs coordinated distribution to ensure proper dissemination, compliance with ethical standards, and institutional approval. Responses were tagged with institutional identifiers for monitoring, but the anonymity of individual participants was strictly protected. Both electronic and paper submissions were accepted and logged securely, allowing institutions with different levels of technological access to participate fully.

3.6. Data Analysis

Quantitative responses were entered into Microsoft Excel for organization and then processed in SPSS for statistical analysis. Descriptive statistics such as frequencies, percentages, and cross-tabulations were generated to summarize faculty profiles and research engagement indicators. These figures were compared to benchmark standards from CHED's CMO No. 52, s. 2016, and the DOST's Scientific Career System (SCS). To enable institutional comparisons, normalized values were calculated and displayed through radar charts, bar graphs, and heatmaps, highlighting disparities and performance trends across SUCs.

The qualitative data were analyzed using Braun and Clarke (2006) six-phase thematic framework: familiarization, initial coding, theme generation, theme review, theme definition, and final narrative synthesis. Two independent coders examined the open-ended responses to enhance interpretive validity. Inter-coder reliability was measured with Cohen's kappa ($\kappa = 0.83$), indicating strong agreement (Landis & Koch, 1977). Emergent themes were grouped into four main categories: institutional enablers, systemic barriers, alignment with national research frameworks, and faculty-driven recommendations. Although the questionnaire did not directly measure teaching loads, many

respondents identified heavy instructional duties as a significant barrier to research engagement, supporting findings from previous studies (Launio et al., 2024; Rosario, Navigar, Gamit, Mendoza-Armiendo, & Depante, 2025).

The integration of quantitative and qualitative data followed a triangulation protocol inherent to the convergent parallel design. This approach allowed for the identification of convergent and divergent trends between numeric indicators and narrative experiences, thereby enhancing both the depth and contextual validity of the study's findings.

3.7. Ethical Considerations

Ethical clearance was obtained from the Philippine Normal University–Manila Research Ethics Committee (REC Code 040519-382). The study adhered to the ethical principles outlined in the World Medical Association (2013) and complied with the Philippine Data Privacy Act of 2012 (RA 10173). Participants received a detailed explanation of the study's objectives, their rights, and data confidentiality protocols. Informed written consent was obtained from all participants. Anonymity was maintained throughout the research process, with data stored in encrypted digital repositories accessible only to the core research team. Consistent with institutional guidelines, all data will be retained for a minimum of three years.

4. RESULTS AND DISCUSSION

4.1. Quantitative Summary of DOST-SCS Classification

Table 1 presents the comprehensive research productivity profile of faculty across five SUCs in Region II, benchmarked against the DOST Scientific Career System (SCS) classifications. The findings indicate that SUCs 1 to 3 meet the baseline qualifications for the Scientist I–II level, including the required master's degree, demonstrated supervision of research projects, and at least two Scopus/ISI-indexed publications. However, a deeper analysis reveals that research productivity is highly stratified, with notable gaps in higher-tier classifications and research engagement that exceed minimum thresholds.

Table 1. Research productivity profile of faculty in region II SUCs based on Dost Scientific Career System (SCS) classification.

DOST Classification	SUC 1 (n=55)	SUC 2 (n=50)	SUC 3 (n=45)	SUC 4 (n=60)	SUC 5 (n=60)
Master's degree holder (Required)	44 (80%)	38 (76%)	37 (82%)	53 (88%)	54 (90%)
Doctorate degree holders (not required but noted)	11 (20%)	12 (24%)	8 (18%)	7 (12%)	0 (0%)
Total no. of Scopus/ISI publications per SUC	11	7	10	1	0
No. of DDH with Scopus publications	8	7	8	0	0
DDH with ≥2 Scopus/ISI publications	3	2	2		
Authorship (Sole / Co / Both)	7 / 4 / 5	5 / 2 / 2	6 / 4 / 3	1 / 0 / 0	0 / 0 / 0
≥10 years R&D beyond master's					
Research training attendance	42 (76%)	39 (78%)	36 (80%)	18 (30%)	15 (25%)
Supervision of research projects	40 (73%)	35 (70%)	32 (71%)	20 (33%)	10 (17%)
Non-ISI/Scopus Publication	20 (36%)	17 (34%)	14 (31%)	26 (43%)	26 (43%)
Publication outlet - Journals only	11 (20%)	9 (18%)	8 (18%)	10 (17%)	9 (15%)
Publication outlet - Conference only	7 (13%)	6 (12%)	5 (11%)	6 (10%)	4 (7%)
Publication outlet - Both Journals & Conference	20 (36%)	18 (36%)	15 (33%)	20 (33%)	15 (25%)
Planning to publish in the next 5 years	51 (93%)	47 (94%)	42 (93%)	28 (80%)	53 (88%)
STATUS (Scientist I–II Qualified)	Qualified	Qualified	Qualified	Not qualified	Not qualified
Scientist II–III (≥3 Scopus/ISI)	Not Met	Not Met	Not Met	Not Met	Not Met
Scientist III–IV (≥4 Scopus/ISI)	Not Met	Not Met	Not Met	Not Met	Not Met
Scientist IV–V (PhD + ≥5 Scopus/ISI + ≥10 yrs R&D)	Not Met	Not Met	Not Met	Not Met	Not Met

Note: DDH stands for Doctorate Degree Holders. Scopus/ISI publications refer to outputs indexed in international databases. Non-ISI/Scopus publications include local journals and conference papers. Authorship types are "Sole" (single author), "Co" (collaborative), and "Both." The "≥10 years R&D beyond master's" is estimated using related indicators such as research training, supervision, publication activity, and publishing plans. "STATUS" shows whether faculty meet the DOST Scientist I–II criteria. Percentages are based on the total faculty per SUC. DOST SCS rank requirements include: Scientist II–III (≥3 indexed papers), III–IV (≥4), and IV–V (PhD + ≥5 papers + ≥10 years R&D).

Across the three qualified SUCs, SUC 1 stands out with 11 Scopus publications and a relatively high share of doctorate degree holders (20%), with 8 of these contributing to Scopus outputs. Similarly, SUCs 2 and 3 exhibited aligned profiles, albeit at slightly lower publication volumes. Notably, all indexed publications across SUCs 1 to 4 were produced exclusively by doctoral faculty, confirming that advanced credentialing (DDH) is a critical driver of publication success. SUC 1's DDH publication rate reached 72.72%, suggesting strong research mentorship potential and alignment with national research targets.

Conversely, SUC 4 and SUC 5, despite having high proportions of master's degree holders (88% and 90%, respectively), reported almost no Scopus publications. These institutions fell short of the minimum publishing criterion and are, therefore, not qualified under the Scientist I–II level. This reflects an underlying structural issue: academic qualifications alone do not ensure research productivity in the absence of enabling institutional environments and sustained publication support.

In terms of broader productivity indicators, non-ISI/Scopus publications were more prominent across all SUCs, particularly SUCs 4 and 5, where nearly **43.3%** of faculty had published in non-indexed outlets over the past five years. These outputs, while contributing to local dissemination and professional development, do not satisfy the metrics under DOST's classification system, thereby limiting career advancement and institutional research reputation.

Despite the current performance, faculty aspirations appear promising. More than 88% of all SUCs expressed an intent to publish within the next five years, indicating a strong motivational base. Yet, this ambition must be matched by policy support and institutional infrastructure.

4.2. Comparative Research Productivity Indicators

To enhance clarity, Table 2 summarizes key productivity indicators across SUCs. This comparison is based on the raw data from Table 1, highlighting critical gaps in research mentorship, publication output, and supervision across SUCs.

Table 2. Summary of key research productivity indicators across SUCs.

DOST Classification	SUC 1 (n=55)	SUC 2 (n=50)	SUC 3 (n=45)	SUC 4 (n=60)	SUC 5 (n=60)
Scopus publications	11	7	10	1	0
Doctorate degree holders with Scopus outputs	8	7	8	0	0
Research supervision (%)	40 (73%)	35 (70%)	32 (71%)	20 (33%)	10 (17%)
Qualified under SCS I–II	Yes	Yes	Yes	No	No

This simplified comparative view illustrates how SUCs 1–3 demonstrate consistent engagement in research training and publication activities, particularly among DDHs. In contrast, SUCs 4 and 5 lack publication-qualified faculty under the SCS standards, underscoring the importance of institutional investment in research mentorship, training, and infrastructure.

4.3. Visualizations of Research Disparities (Figures 1 & 2)

To further visualize disparities in research productivity, two graphical representations were developed based on the same DOST SCS indicators.
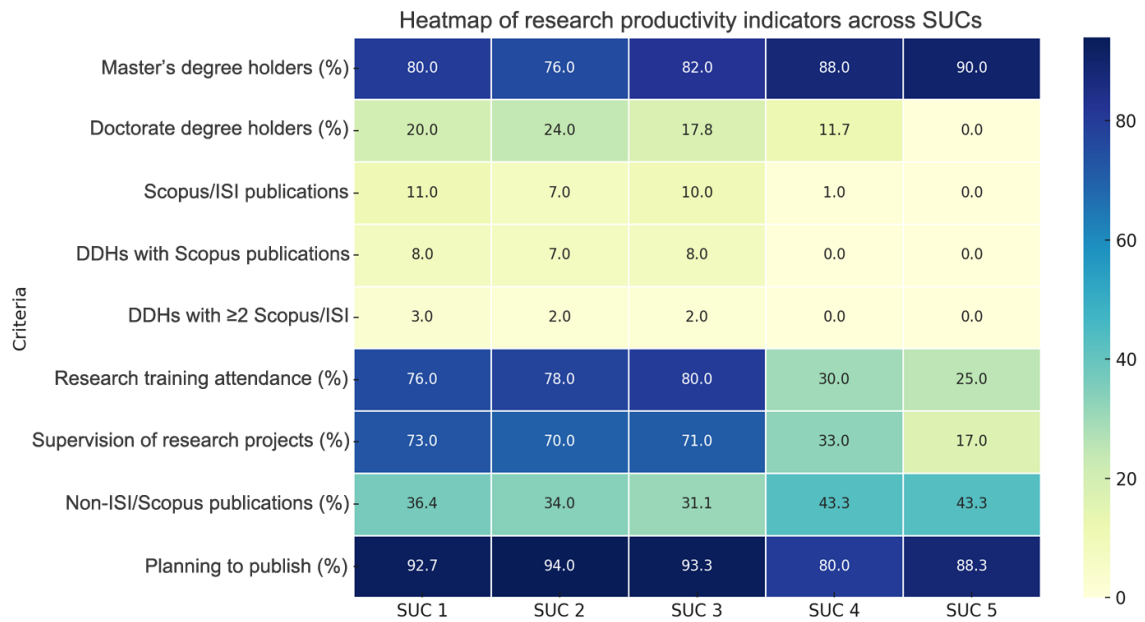
Figure 1. Heatmap of research productivity indicators across SUCs (Based on DOST SCS Criteria).

Note: The heatmap shows the percentage of faculty meeting key research productivity indicators across five SUCs in Region II. These include degree qualifications, Scopus/ISI publications, research training, project supervision, non-indexed publications, and plans for future publication. Darker colors represent higher values. Indicators are based on research benchmarks from CHED and DOST.

The color gradient illustrates the comparative intensity of output per SUC, focusing on indicators such as Scopus publications, doctoral authorship, and project supervision.
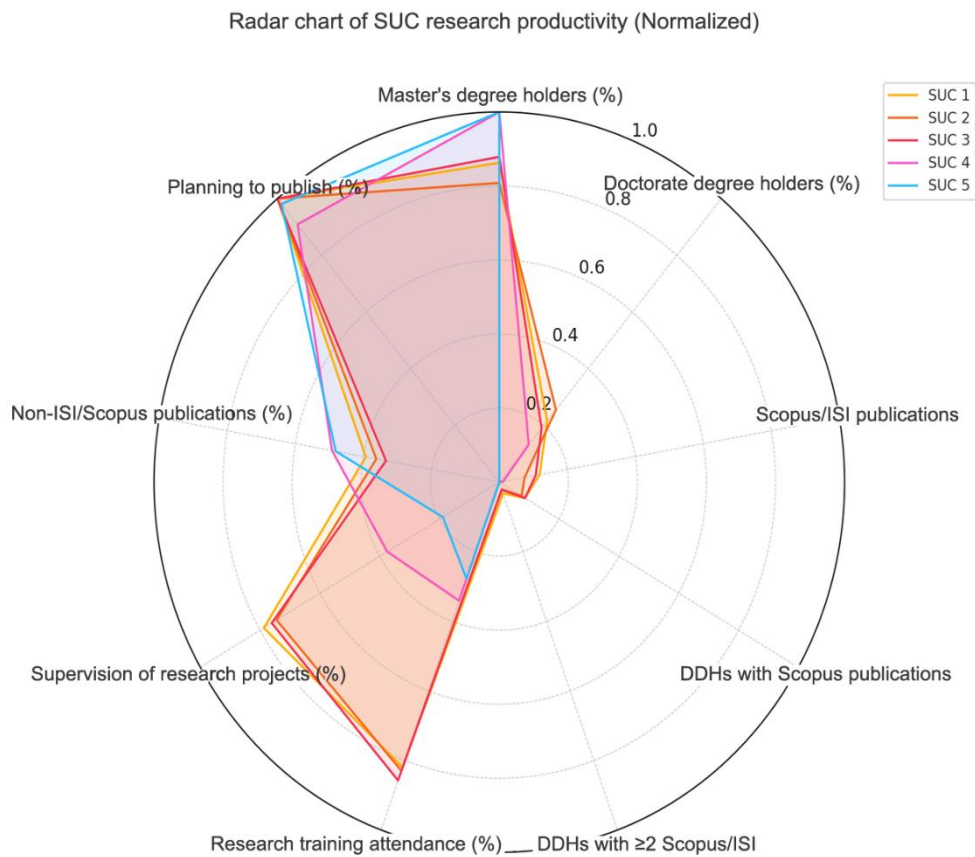

Figure 2. Radar chart of normalized research productivity per SUC.

Note: Data adapted from Table 1 of this study. Visual generated by the authors using normalized scores based on DOST SCS indicators.

To enable more precise comparison, indicators were normalized using a min-max scale across SUCs for metrics such as Scopus publications, co-authorship, training attendance, and research supervision. This visualization makes disparities in engagement and capacity more apparent.

These visualizations reinforce the earlier interpretation of Table 1, particularly the clustering of productivity among a small cadre of doctorate-holding faculty, as seen in SUC 1. The steep drop in normalized productivity in SUCs 4 and 5 underscores the need for systemic investment in research infrastructure. Additionally, the flattening of indicators related to authorship types (sole, co, both) and the absence of DDHs with two or more Scopus outputs in SUCs 4 and 5 align with qualitative reports of insufficient publication mentorship and institutional support.

4.3.1. Qualitative Insights and Institutional Realities

The quantitative data reveal a concentrated pattern of research productivity in Region II SUCs, where SUCs 1 to 3 primarily meet DOST's Scientist I–II standards through Scopus-indexed outputs authored by doctorate degree holders (DDHs). SUC 1, in particular, showed significant output with 11 indexed publications, all authored by DDHs, highlighting the link between advanced qualifications and publication capacity. However, this productivity is limited to a small group of faculty. Qualitative narratives support this observation. As Participant 142 explained, balancing teaching, administrative, and research responsibilities is only feasible with strong institutional support, a feature that varies across campuses.

4.3.2. Global Comparisons and Regional Reflections

This pattern aligns with findings in Vietnam, Uganda, and Cambodia, where research outputs are primarily focused on faculty with doctoral degrees and international exposure (Atibuni, 2020; Heng, Hamid, & Khan, 2023; Nguyen, 2020). Similarly, despite high rates of master's degree attainment in SUCs 4 and 5, Scopus publications were minimal, indicating that credentials alone are not enough without structural support, an issue also observed in Chile's teaching-heavy academic environments (Carcamo et al., 2025).

Participants 46 and 107 cited ongoing delays in research funding and lack of mentorship as major barriers. These concerns are echoed in other Global South contexts where promotion policies and research incentives are unclear or inconsistently enforced (Nakijoba & Awobamise, 2022). Participant 111 also pointed out discouraging peer dynamics and a lack of transparency in journal review processes, especially in high-impact outlets, which discourages early-career publication.

4.3.3. Bridging Gaps and Building Systems

Despite these constraints, faculty across all five SUCs expressed strong research intentions; 88% to 94% planned to publish in the next five years. This optimism highlights latent potential that, if supported, could shift institutional trajectories. As seen in other developing contexts, non-monetary factors such as mentorship, mobility, and recognition often outweigh financial incentives in stimulating research (Jessani, Valmeekanathan, Babcock, & Ling, 2020; Launio et al., 2024; Mendina, 2024).

The prominence of non-ISI/Scopus publications, especially in SUCs 4 and 5, where 43.3% are published in non-indexed outlets, reflects active local dissemination. However, these outputs are undervalued in international rankings. This challenge is emblematic of the broader critique against "Scopus-centrism" in Philippine academia, which sidelines regionally rooted scholarship in vernacular formats (Juan, 2024). Comparable exclusions persist in Latin America, where robust national publishing networks remain underrecognized by global indexing bodies (Beigel, 2021).

Participant 142 emphasized that integrating research into faculty workflows depends significantly on leadership and organizational culture. In India and South Africa, structured mentorship programs have been effective in improving research identity and output (Madikizela-Madiya, 2023; Sharma & Kaushik, 2022). In contrast, Philippine

SUCs operate largely through ad hoc initiatives, with limited inter-campus collaboration, further inhibiting research progression.

Table 3. Alignment of SUC faculty profiles with the CHED researcher classification framework and core competency indicators.

Trait category / SUC	SUC 1	SUC 2	SUC 3	SUC 4	SUC 5
CHED researcher classification					
First-stage researcher	Satisfied: With competencies & early research outputs	Satisfied	Satisfied	Lacks outputs & core skills	No research activity
Early career researcher	Not Qualified: Lacks research independence and leadership	Not Qualified	Not Qualified	Not Qualified	Not Qualified
Established researcher	Not Qualified: No long-term publishing or project leadership	Not Qualified	Not Qualified	Not Qualified	Not Qualified
Leading researcher	Not Qualified: No team leadership or national research roles	Not Qualified	Not Qualified	Not Qualified	Not Qualified
Core competencies (Qualitative themes)					
Computational skills	✓	✓	✓	No	No
Conceptual skills	✓	✓	✓	No	No
Technical skills	✓	✓	✓	No	No
Quantitative research outputs					
Doctorate degree holders	11	12	8	7	0
Scopus publications	11	7	10	1	0
DDH with Scopus outputs	8	7	8	0	0
Authorship (Sole / Co / Both)	7 / 4 / 5	5 / 2 / 2	6 / 4 / 3	1 / 0 / 0	0 / 0 / 0
Qualification summary					
CHED classification qualification	First stage only	First stage only	First stage only	Not qualified	Not qualified

Note: *CHED Classification Definitions:
  (1) First Stage Researcher: Doctoral candidates conducting research under the supervision of the principal investigator
  (2) Early Career Researcher: PhD holders within 10 years of graduation but without research independence, experience, and competence
  (3) Established Researcher: Demonstrated independence and consistent research leadership.
  (4) Leading Researcher: Research leaders or team leads with national/international recognition.
  *DDH = Doctorate Degree Holders.
  *Core competencies were derived from qualitative responses during the study.
  *"✓" indicates the presence of the skill; "No" indicates lack of evidence in qualitative responses.
  * Authorship types include Sole (independent authorship), Co (collaborative), and Both.

4.4. CHED Researcher Classification and Faculty Capacity in Philippine SUCs

Table 3 synthesizes faculty competencies and research outputs across five State Universities and Colleges (SUCs) in Region 02, benchmarked against the CHED Researcher Classification Framework. Figure 3 provides a visual heatmap of SUC classification performance and core competencies based on CHED benchmarks, highlighting both strengths and performance gaps.
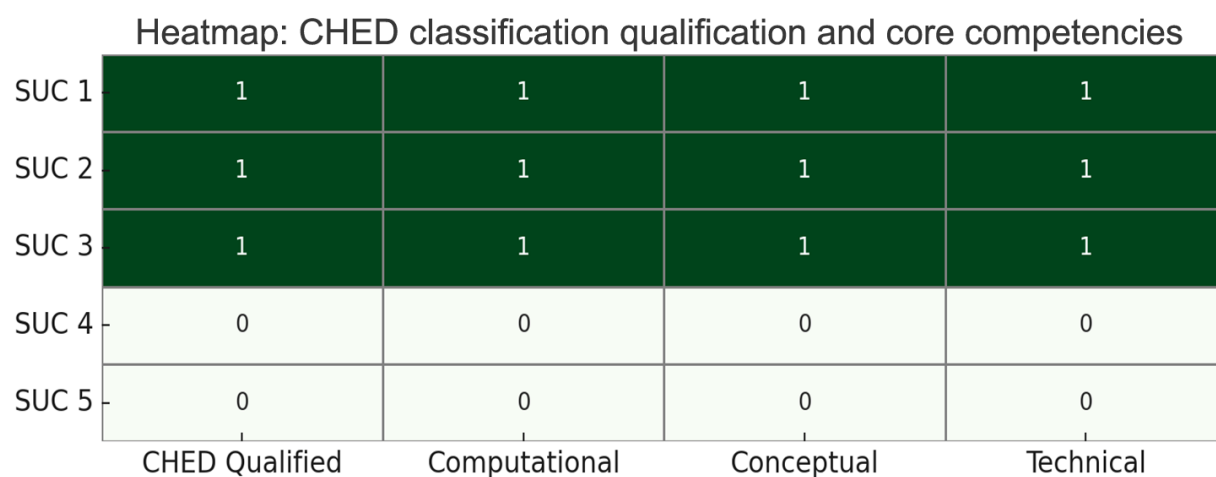
Heatmap: CHED classification qualification and core competencies

	CHED Qualified	Computational	Conceptual	Technical
SUC 1	1	1	1	1
SUC 2	1	1	1	1
SUC 3	1	1	1	1
SUC 4	0	0	0	0
SUC 5	0	0	0	0

Figure 3. Heatmap of CHED classification qualification and core competencies by SUC.

Note: Visual representation of SUC performance based on the CHED researcher classification framework and qualitatively coded core competencies (Computational, conceptual, and technical). Data triangulated from survey responses and faculty narratives.

SUCs 1 to 3 qualify under the First Stage Researcher level, while SUCs 4 and 5 do not meet the minimum criteria for any classification. Faculty members in SUCs 1 to 3 demonstrate core competencies in computational, conceptual, and technical areas, supported by institutional records and qualitative evidence. As shown in Figure 3, SUCs 1 to 3 consistently meet the CHED-defined benchmarks for computational, conceptual, and technical research competencies, while SUCs 4 and 5 fall significantly behind in all three areas. This visual comparison reinforces the qualitative findings and highlights the competency gaps that limit progression beyond the First Stage Researcher classification.
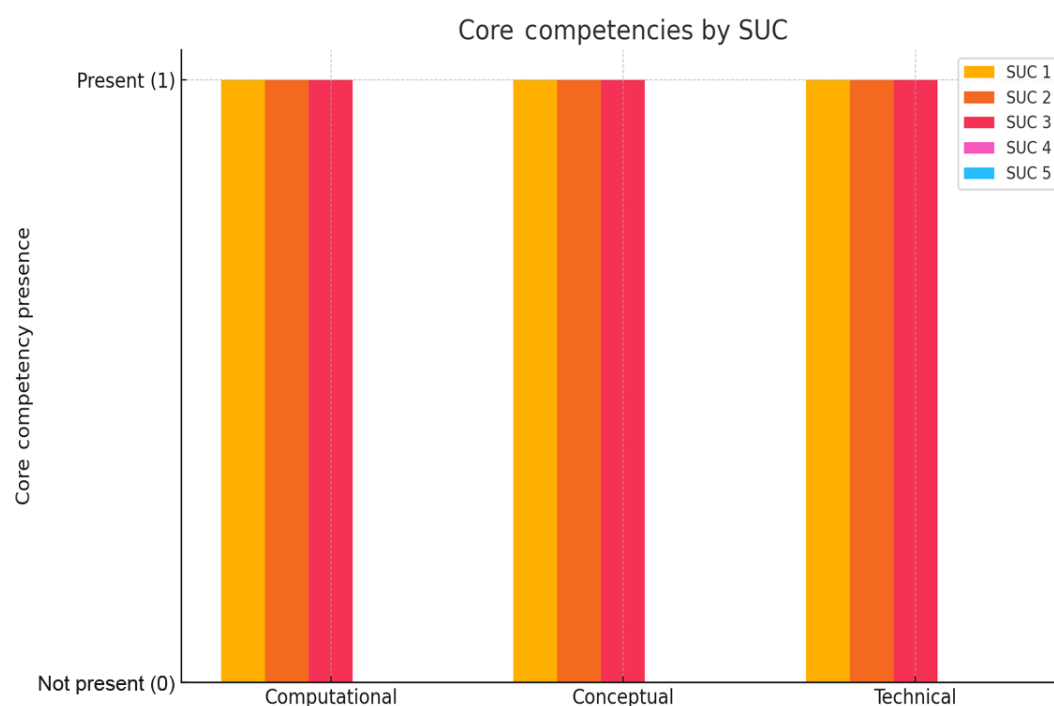
Core competencies by SUC

Figure 4. Grouped bar chart of core competency indicators (Computational, conceptual, technical) across SUCs 1 to 5.

Note: The bar chart was created by the authors using thematic analysis results of faculty responses coded according to core research skills. Competency distribution is based on CHED benchmarks and internal coding of collected qualitative data.

Building on these observations, Figure 4 visually presents the distribution of core research competencies among SUCs 1 to 5. The first three SUCs display evident strengths in computational, conceptual, and technical domains, whereas SUCs 4 and 5 reveal no such competencies. This disparity aligns with CHED benchmark standards and

reflects the qualitative evidence gathered. The pattern further clarifies why SUCs 1–3 satisfy the criteria for First-Stage Researchers, while SUCs 4–5 fall below that threshold.

Participant 33 emphasized the triadic faculty role encompassing instruction, research, and extension, while Participant 39 reinforced the university's mandate for active research involvement. Quantitative data revealed modest Scopus-indexed outputs, averaging one to two publications per doctorate holder, and mostly collaborative authorship patterns. To better illustrate the publication productivity among doctoral holders, Figure 5 presents a bar chart comparing the number of doctoral faculty and their Scopus-indexed publications across SUCs.
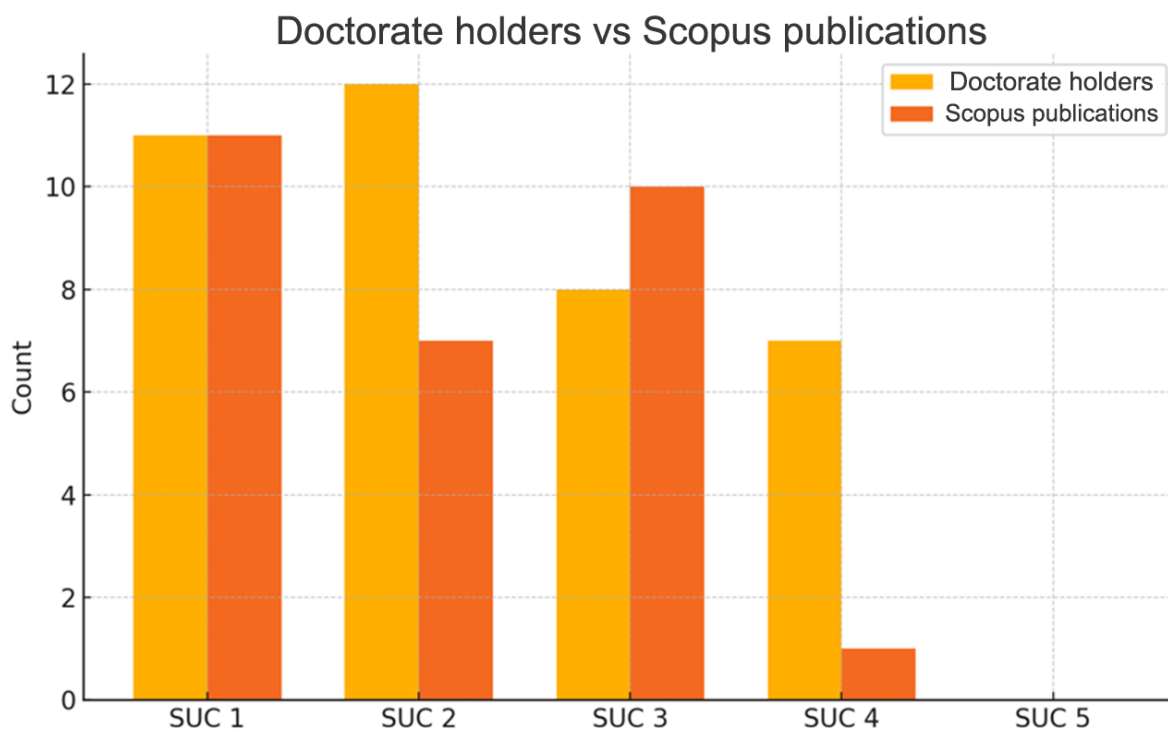
Figure 5. Bar chart of doctorate degree holders vs. Scopus publications across SUCs.
Note: Author-generated visualization based on aggregated data from institutional survey results and faculty profile documentation.

4.4.1. Researcher Pathways, Institutional Support, and Performance Gaps

The data revealed emerging trends of independent authorship among certain faculty members, with SUC 1 reporting the highest number of sole-authored publications (n = 7), followed by SUC 3 (n = 6) and SUC 2 (n = 5). Qualitative accounts from Participants 88, 176, and 26 demonstrated that research activity, although present, often depended on mentorship and administrative support rather than self-directed scholarly leadership. While several faculty members hold doctoral degrees, many lack the consistent research output and independence needed for higher-tier CHED classifications, reflecting global concerns about early-career researchers (Niemczyk & Rónay, 2023). Barriers such as lack of time, limited funding, and bureaucratic delays, mentioned by Participants 31 and 100, remain ongoing challenges. Although some, like Participant 8, find research intrinsically rewarding, others are more motivated by external factors (e.g., peer influence, as noted by Participant 22), highlighting the importance of structured mentorship and institutional support (Liardet, 2024).

Notably, none of the SUCs achieved CHED's Early Career, Established, or Leading Researcher categories. Even among doctoral degree holders, leadership in research remains limited. Participants 111 and 195 mentioned a dependence on individual mentors and post-PhD engagement, while Participant 125 observed that research often primarily fulfills compliance requirements for CHED, ISO, and AACCUP, indicating a transactional rather than transformative research culture.

4.4.2. Cross-National Insights and Structural Barriers

Cross-national comparisons further contextualize these challenges. International models, such as Vietnam's policy-supported research structures, provide valuable insights (Tran, 2024). Interdisciplinary initiatives in the EU and Brazil (Sousa, De, Afonso, & Borges, 2024; Spyropoulou & Kameas, 2024) and South Africa's postgraduate mentorship schemes (Niemczyk & Rossouw, 2017) demonstrate the value of systemic support. In the Philippines, similar structures are still emerging.

Participants like 28 and 174 emphasized national contributions and personal passion, but such motivations are often undermined by structural constraints. Faculty frequently pursue doctorates for promotion (Participant 153), while incentive-driven participation (Participant 107) further reflects the performative nature of research engagement.

SUCs 4 and 5 showed the weakest outputs, with SUC 5 lacking Scopus publications and SUC 4 reporting only one. Participant 23 mentioned unclear expectations, and others cited a lack of infrastructure, mentoring, and training. Even institutions like SUC 2, which have a relatively stronger academic profile, struggled with continuity, showing that credentials alone do not guarantee consistent research performance. These findings align with studies from Uganda, South Africa, and other Global South countries, where mentoring gaps, funding issues, and poor policy execution impede research growth (Abouzeid et al., 2022; Armas & Villegas, 2025; Castulo, 2024; Mokhachane, Green-Thompson, & Wyatt, 2024).

Promising global models, such as India's transdisciplinary methods (Rajnath, 2024) and Kazakhstan's incentive systems (Zakirova, Shakual, Abaidullayeva, Sissenova, & Makasheva, 2024), could provide frameworks adaptable to the Philippine SUC context.

5. CONCLUSION

This study provides a multidimensional view of the research involvement of STEAM faculty in Region II State Universities and Colleges (SUCs). It draws on the standards of the CHED Researcher Classification Framework and the DOST Scientific Career System. Findings show that while some faculty, mostly those with doctoral degrees, qualify for the entry-level categories under these systems, overall research productivity in the region remains low. Opportunities for advancement are limited, and very few have progressed beyond the First Stage or Scientist I–II level. This suggests that the problem lies less in faculty potential and more in institutional conditions that restrict sustained research activity.

In the Philippines, these results point to broader concerns. Barriers include the lack of mentoring support, heavy teaching responsibilities, inconsistent institutional incentives, and scarce funding. Although CHED and DOST frameworks aim to set standards for excellence, they often fail to address disparities faced by under-resourced SUCs. The fact that Scopus-indexed outputs are concentrated among a small group of doctorate holders shows the need for policies that both reward achievement and expand institutional capacity across all SUCs.

Beyond the local setting, the study contributes to global discussions on the limits of universal research metrics. The case of Region II demonstrates how rigid benchmarks and publication-driven models risk sidelining context-based scholarship, particularly in institutions that are not fully prepared to compete. Similar patterns are evident in parts of Southeast Asia, Sub-Saharan Africa, and Latin America, where systemic inequities continue to affect research output.

Aligning local realities with international standards, therefore, requires a shift in perspective, one that values diversity in higher education systems and promotes inclusive, capacity-building approaches to research evaluation.

6. IMPLICATION

The findings highlight the need for policy reforms at both national and global levels. In the Philippines, CHED and DOST could adopt a developmental model of faculty classification, one that recognizes institutional limits and

creates pathways for growth rather than rigid thresholds. Regional support is also crucial, particularly in mentoring, providing protected time for research, and investing in infrastructure. On the global stage, the study contributes to debates on fairer research assessment by advocating for broader definitions of excellence. Such changes would enable institutions in the Global South to build on their own strengths instead of being measured solely by imported standards.

7. LIMITATIONS AND FUTURE RESEARCH

This research has certain limitations. First, it focused only on STEAM faculty from five SUCs in Region II, which may limit the applicability of the findings to other regions or disciplines. The dual-framework approach using CHED and DOST classifications was useful, but it did not cover the full range of indicators commonly used in international studies.

Second, the study depended on self-reported surveys and narratives. These may contain response bias or selective reporting. While triangulation through mixed methods added credibility, the lack of a longitudinal design limited the ability to track changes in research engagement over time.

Future studies could move in several directions. Comparative work across other regions or SUCs would clarify whether the trends in Region II are also seen elsewhere. Longitudinal approaches could also show how faculty advance through CHED and DOST classifications over time. Expanding the scope to other disciplines, or including student and institutional perspectives, may also provide richer insights. Finally, evaluating the impact of specific interventions, such as mentoring programs or funding schemes, would help test how well proposed frameworks work in practice.

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